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Abstract

This thesis presents a new theory of control in which the control predicate establishes control between PRO and the controller by Agreeing with both of them and checking their semantics at a later point of the derivation. Each DP possesses its own index as a syntactic feature. As the predicate Probes for these two Goals, it keeps track of the indexes of the controllee and controller with the control calculus, a part of the narrow syntax. The calculus is sensitive to the semantics of these nominal phrases after transfer to LF. This derives subject control in (1), which Culicover & Jackendoff (2001) argue exists due to the lexical semantic role Source on the Agent θ -role of *promise*.

- (1) John_i promised Mary_k PRO_i to eat pizza.

If the set containing the index of the controller is a subset of the set containing the index of the controllee, the derivation does not crash; otherwise, it crashes. This approach provides a derivation for the phenomenon of split control in (2), which Landau (2013) points out no account to date has been able to solve, and derives partial control in (3), along with deriving many other control phenomena.

- (2) John_i promised Mary_k PRO_{i+k} to meet at 6. (because $\{i\} \cup \{k\} \subseteq \{i+k\}$)

- (3) John_i tried PRO_{i+} to meet up at 6. (because $\{i\} \subseteq \{i+\}$)

A major consequence of this solution is that it rejects the autonomy of syntax as proposed by Chomsky (1957); syntax provides a basis for semantics, which is not included in the grammar. But this paper argues that control phenomena show the need for a unified syntax and semantics approach to control, where both play a part in deriving sentences.

CONTROL AS MULTIPLE AGREE

by

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B.A., University of Massachusetts at Amherst, 2015

Thesis

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1 Introduction

Control theory is one of the most controversial areas of research in formal syntax and semantics. Although (4) and (5) look identical on the surface, the two have a very different derivation. While (4) involves Movement from the subject of embedded infinitival of *John* to matrix subject, (5) involves no Movement; instead, the subject position of the infinitival is filled with PRO.

(4) John seems [~~John~~ to be happy].

(5) John_i tried [PRO_i to be happy].

The existence of PRO has been a mystery for syntacticians since the 1980s. According to Chomsky (1981, 1986) and Manzini (1983), PRO is [+anaphoric], meaning it must always have an antecedent, and [+pronominal], because it can have an arbitrary reference. If PRO's meaning is determined by an antecedent, then it is *controlled*. Yet, the existence of sentences such as the following seem to have no apparent controller of PRO, meaning that it is likely not [+anaphoric].

(6) To eat apples is fun.

Although Lebeaux (1984), Epstein (1984) and Bhatt & Izvorski (1998) have attempted to find an antecedent for all occurrences of PRO, Kawasaki (1993)'s example in (7) shows that one cannot come up with an antecedent for all occurrences of PRO, given that the antecedent that Bhatt, Epstein and Lebeaux have tried to argue is always the implicit controller of PRO is clearly not controlling it.

(7) It is dangerous for babies [PRO_{arb} to smoke around them].

In addition, although PRO may be [+anaphoric], it need only be *partially* controlled. This is shown in split control in (8), where PRO is partially controlled by each of two controllers, and in (9) where PRO has an index that refers to more than its controller.

(8) Jack_i promised Brian_k PRO_{i+k} to play games together.

- (9) Jack_i tried PRO_{i+} to meet at the zoo.

This, along with many other control phenomena, make a control theory that can account for all of these facts difficult to come up with. But this is the goal of this thesis, in which I attempt to derive all of control theory with the use of the operation Agree and lexical semantics in the narrow syntax.

This thesis is structured as follows. In Chapter 2, I present in more detail the various facts that we see in control structures across languages. Chapter 3 presents each approach to control that has attempted to account for some of these facts, and concludes that none of them do so successfully. Chapter 4 presents the theory of control as proposed by this thesis, with illustrative derivations. Chapter 5 mentions the consequences and attempts to solve problems that arise with this approach to control. Chapter 6 concludes; before concluding, I present the idea that PRO is a pronominal yet pseudoanaphor as derived by the mechanism proposed in this thesis, and its only difference with little *pro* is its inability to receive Case.

2 The Existence of PRO and Control Phenomena

2.1 Chapter Overview

The primary concern in this chapter is to introduce the reader to empirical phenomena involving control. Section 2.2 goes over the debate on whether PRO exists or not, by presenting evidence from ellipsis, Case and complementizer contrasts between raising and control constructions. Section 2.3 goes over some of the most challenging empirical facts that have been noted regarding control, noting the importance of both syntax and lexical semantics in determining the controller of PRO, in addition to providing more evidence for the existence of PRO in the form of partial and split control.

Section 2.3.1 introduces the reader to the usual case of obligatory control, in which the controller is always the same—something that is determined by the control predicate. Section 2.3.2 presents the case of non-obligatory control, in which this need not be the case. Section 2.3.3 points out other control facts that have not been very rigorously analyzed: backward, adjunct and copy control. Section 2.4 gives strong evidence to think *tough*-constructions involve control and not raising.

The intention is to introduce the reader to a very complicated paradigm before considering theoretical approaches that fall short of accounting for most of the facts. A strong theory of control must include a synthesis of syntax and lexical semantics, rather than a purely syntactic or semantic approach, as has been proposed in the literature.

2.2 Does PRO Exist?

Before looking at different views of control theory, it is important to first identify what the empirical facts are. After all, the first and foremost goal of a successful theory of control is to be able to derive different kinds of control, in addition to being able to predict currently undiscovered phenomena. Further, a successful theory of control must be able to explain in what contexts we get control, when it is obligatory or not, and so

on. Though important, this is an exceedingly difficult task. As the next chapter points out, all current theories of control usually apply only to a subset of empirically observed phenomena.

Let's start with the basics. While (10) and (11) look alike, there is reason to believe that they differ in their syntactic structure. In particular, raising constructions such as (10) deal with Movement of the infinitival Spec,TP subject to matrix Spec,TP, while (11) is a control construction, in which there is no Movement. Instead, there is a null subject, the controllee, that has its syntactic index determined by a controller. In this case, the controller would be the DP in matrix Spec,TP position.

(10) John seems [_{TP} ~~John~~ to be happy].

(11) John_i tried [_{TP} PRO_i to be happy].

This contrast has been motivated by the θ -Criterion of Chomsky (1981), which is defined as follows:

(12) Each argument bears one and only one θ -role.

(13) Each θ -role is assigned to one and only one argument.

A θ -role is a thematic relation between a predicate and a noun phrase. The number, type and position of each θ -role is in the verb's lexical entry, and if a θ -role is not fulfilled, this leads to ungrammaticality. In a simple example like *John loves Jack*, *John* is the Agent of love and *Jack* is the Theme of *love*. A sentence such as *John loves* in which the intended meaning is *John loves himself* is ungrammatical because *John* cannot receive the Theme role, and thereby move into an Agent θ -role position, or Spec,vP.

It is easy to see that the matrix predicate of (10), *seem*, does not assign an external θ -role to its subject, due to the possibility of a sentence such as (14), in which the expletive *it* has no meaning. However, (15) shows that *try* must have a meaningful external argument, and therefore assign a θ -role to this argument, because you cannot insert the same expletive.

(14) It seems to be raining.

(15) *It tried to be raining.

It is now possible to explain the contrast between (10) and (11). In (11), the existence of PRO is assumed, because if *John* moved up from the subject position of *be happy*, it would receive two θ -roles, violating the θ -Criterion of Chomsky (1981), which says that each argument can only receive one θ -role.

Would it be possible to remove this condition? According to Chomsky, we need the θ -Criterion as stated so that (16) doesn't mean (17), given that *send* seems to have an optional θ -role, which is the receiver of the object being sent:

(16) Mary sent John.

(17) Mary sent John to himself.

However, the θ -Criterion itself is controversial: this approach states it as an independent principle of syntax, but according to approaches such as Heim & Kratzer (1998), it is possible to derive it with a system of formal semantics, making it superfluous. We should then come up with a way to defend the existence of PRO that does not rely on the θ -Criterion. And there are many reasons for believing that it does exist, independently of this *ad hoc* syntactic criterion that should belong in semantics.

Landau (2013), with his examples in (20)-(21), shows that VP-ellipsis, which erases elements below T in English, does the same in infinitival phrases, deleting everything below *to*. This would be hard to explain if infinitival phrases were not clausal, all of which have subjects.¹

¹This follows from the Extended Projection Principle of Chomsky (1982), which states that clauses must contain a DP in subject position, which is Spec,TP in English. This explains the existence of expletive-insertion, in which clauses can have a meaningless and seemingly unnecessary subject.

(18) *Is raining.

(19) It is raining.

(20) She didn't hope that Brian would recover soon, but we did ~~hope that Brian would recover soon~~.

(21) She didn't hope to recover soon, but we hoped to ~~recover soon~~.

Basic syntactic tests from Koster & May (1982) involving conjunction of infinitival phrases and finite clauses work, meaning that infinitival phrases must also be clauses of some kind, and hence have a subject.

(22) [[To write a novel] and [for the world to give it critical acclaim]] is John's dream.

(23) [John expected to write a novel] but [that it would be a critical disaster].

Further, there is reason to believe that there is a syntactic object in the subject position of an infinitival phrase in Icelandic that actually receives Case. Examples from Sigurðsson (1991) show that PRO receives accusative Case with examples of floating quantifiers:

(24) Strákarnir_i vonast til [að PRO_i vanta ekki *alla* í skólann]
 the.boys.NOM hope for to PRO.ACC to.lack not all.ACC in the.school
 'The boys hope not to be all absent from school.'

The floating quantifier *alla* agrees in Case with the local subject, PRO, and not the controller, *the boys*. The presence of Case would be completely mysterious if there were not a subject inside the infinitival phrase. Interestingly, there is no case mismatch in raising constructions, which involve Movement rather than PRO. This gives more reason to believe in a raising/control contrast. The quirky case that is determined by the embedded predicate shows up on the matrix subject:

(25) Strákana virðast [_{t_i} vanta ekki *alla* í skólann]
 the.boys.ACC seem _t to.lack not all.ACC in the.school
 'The boys seem not to be all absent from school.'

Next, an analysis of Hebrew in (26)-(27) from Landau (2002) gives us very strong reasons to believe that raising constructions are fundamentally different from control constructions, and hence that PRO exists.

- (26) Rina_i xadla [(me-) PRO_i le'acben et Gil].
 Rina stopped (from-) PRO to.irritate ACC Gil
 'Rina stopped irritating Gil.'
- (27) Ha-muzika ha-ro'ešet_i xadla [(me-) t_i le'acben et Gil].
 the-music the-noisy stopped (*from-) t_i to.irritate ACC Gil
 'The loud music stopped irritating Gil.'
- Hebrew

me- is an infinitival complementizer associated with complements that have a negative entailment, while the verb *xadla* is ambiguous between raising and control, and only animate DPs can control. In (26), the subject is animate while it is not in (27). The most reasonable assumption to make when presented with these data is that infinitival phrases are clauses, and hence contain subjects: a complementizer, C_0 , is the head of a CP, which necessarily marks an embedded clause as its complement. It would otherwise be mysterious as to how a complementizer can attach to a bare vP.

But Landau's examples show more than just that raising and control infinitives are clauses. It also provides evidence for a crosslinguistic distinction between control infinitives as CPs and raising infinitives as TPs. When there is an animate DP with the verb *xadla*, there is control and an infinitival complementizer, whereas there is no complementizer with an inanimate DP. This contrast cannot be explained if raising and control infinitives are both TPs, or both CPs; some kind of a distinction is therefore necessary.

2.3 Control Phenomena

The rest of this chapter continues to distinguish between obligatory control (OC) and non-obligatory control (NOC), while presenting other kinds of control and commenting on the status of *tough*-constructions in the raising or control debate.

It is important to define these two separate kinds of control as more evidence for the existence of PRO belongs to a subset of obligatory control. In particular, *partial* and *split* control both involve PRO which is only "partially" controlled by a controller. This makes it difficult to argue that the subject of the infinitival doesn't exist, or that it can be de-

rived by Movement, given that they do exist, and cannot be derived by Internal Merge.

2.3.1 Obligatory control

Obligatory control represents the usual case of control; the controller is determined by its position in the entire sentence and the control predicate that is in the sentence. PRO must always be semantically interpreted as a bound variable of that controller. As we will shortly see, both lexical semantics and syntax play a role in the kind of control that is present in a given sentence.

This contrasts with *free control*, first pointed out by Postal (1970), and his example is given in (28). PRO can be understood to refer to *Harry*, *Bill* or both at the same time, which would be a case of split control. The case of obligatory control would only allow one argument to be the controller.²

(28) Harry talked to Bill about PRO kissing Greta.

Obligatory control can be classified based on two dimensions, whether the controller is the subject of the predicate or whether the controller is the object of the predicate. Subject and object control are represented respectively in (29) and (30).

(29) I tried/wanted/ran to help him. *Subject control*

(30) I persuaded/pressured/hit John to help her. *Object control*

The usual cases of control obey locality principles, such as Rizzi (1990)'s Relativized Minimality Condition or Chomsky (1995)'s Last Resort. However, Rosenbaum (1967) was the first to point out the famous counterexample to locality in control involving the verb *promise*. Even when this verb has an object, the controller must always be the subject.

(31) I_i promised John [PRO_i to help him].

²But it can also have a PRO_{arb} interpretation in which it refers to people in general kissing Greta, which is a completely sensible interpretation of the sentence.

(32) *I promised John_i [PRO_i to help him].

The difference might be due to the lexical semantics of *promise*. Consider the contrast between (33) and (34) from Culicover & Jackendoff (2001), which they argue differ only in terms of lexical semantics and no difference whatsoever in syntax.

(33) John's promise/vow/offer/guarantee/obligation/pledge/oath/commitment to Susan to take care of himself/*herself

(34) John's order/instructions/reminder/encouragement/invitation to Susan to take care of *himself/herself

Supporting their prediction involving promise, the verb form of *vow* also involves subject control rather than object, which is illustrated in this example from Postal (1970).

(35) I vowed to Zeus to find the thief.

According to them, what seems to be in common with the nominals in (33) is that they have a semantic role called Source, assigned to the giver of the promise. The presence of the thematic relation Source can be associated with subject control, and the lack of it can be associated with object control. But since thematic relations are not syntactic, a syntactic approach cannot account for the paradigm just presented, and a semantic approach should be preferred.

But *promise* is just one of few examples that challenge locality in control. Chomsky & Halle (1968) points out that although *beg* is usually an object control verb, the passivization of the embedded clause may allow *beg* to have subject control rather than object.³

(37) John_i begged Bill PRO_i to be shown the new book.

This is known as the phenomenon of control shift, and it happens in other control predicates as well.

³The reason why Chomsky (1968)'s following sentence has subject control is not so clear.

(36) John gave me the impression of working on that problem.

(38) John_j persuaded Mary_m PRO_j to be allowed to take out the trash.

Control shift also happens with *promise*, and in that case it becomes an object control predicate.⁴

(39) John_j promised Mary_m PRO_m to be allowed to take out the trash.

With the basics of OC established, we can move on to consider lesser known OC phenomena, which also happen to be evidence for the existence of PRO. One subset of OC is *partial control* (PC), in which the index of PRO includes the controller, but refers to more than just the controller. Landau (1999) was the first to provide a thorough analysis of this phenomenon. The class that is not partial control he defines as *exhaustive control*. This class requires strict identity between PRO and the controller, unlike partial control.

(40) *John_i managed [PRO_{i+} to gather at 6].

(41) The chair_i preferred [PRO_{i+} to gather at 6].

(42) *The chair_i began [PRO_{i+} meeting without a concrete agenda].

(43) Bill_i regretted [PRO_{i+} meeting without a concrete agenda].

Partial control being licensed depends on the control predicate in the sentence, and Landau (1999) notes that this property is semantic tense, at least in English, putting further importance on the role of semantics in control. Predicates with semantic tense include factives (glad, sad, regret), propositionals (think, believe), desideratives (want, yearn) and interrogatives (wonder, ask, find out). Untensed predicates include implicatives (manage, bother, make sure), which is a very broad category, aspectuals (begin, finish), modals (could, must) and evaluative adjectives (crazy, stupid). PC complements are always tensed on one hand, while exhaustive control complements are untensed.

While partial control involves a reference greater than its controller, split control involves two controllers, and its reference is no more than both controllers at the same

⁴While multiple solutions for control shift have been proposed in the literature, this thesis will take for granted the approach developed by Farkas (1988), and a summary of it will be presented in section 4.2.

time. Based on the following example, Hornstein (1999) argues that split control is a case of NOC, because OC PRO cannot have split antecedents.

(44) *John_i told Mary_j [PRO_{i+j} to wash themselves/each other].

This ignores multiple other examples in English in which split control is licit. This is simply a problem with the verb *told* rather than the status of split control in English, however. Landau (1999) gives multiple pieces of evidence showing the existence of split control in English, while Landau (2013) points out that it is usually found with verbs of proposal and communication.

(45) John_i proposed to Mary_j [PRO_{i+j} to meet each other at 6].

(46) John_i asked Mary_j [whether PRO_{i+j} to get themselves a new car].

(47) John_i discussed with Mary_j [which club PRO_{i+j} to become members of].

We will see next chapter that the problem of split control has been unsolved by all theories of control to date, and some (e.g. Lebeaux (1984)) as a result have tried to argue that split control is not a unique phenomenon; it is just partial control.

Partial and split control both provide evidence for the existence of PRO. Suppose that PRO did not exist; the existence of these kinds of control would then be completely mysterious. If we took a "control is raising" approach akin to Hornstein (1999), this would completely fail to derive either phenomena since Copy + Merge cannot create syntactic objects with different indexes.

2.3.2 Non-obligatory control

On the other hand, in non-obligatory control, or NOC, PRO need not be interpreted as a bound variable. It can refer to a contextually salient individual or to people in general. Although it can be interpreted that way, there are cases in which we do see examples like split control in NOC contexts.

Cases of NOC often involve the notorious PRO_{arb} , a kind of uncontrolled PRO which does not refer to any DP in the matrix sentence, but rather to contextually salient people in general. This is problematic, since Chomsky (1981, 1986) and Manzini (1983)'s treatment of PRO assume that PRO's referent is necessarily determined by an antecedent; it cannot exist without this antecedent.

But before going into this, examples are given in (48)-(49), along with their features, both noted by Hornstein (1999).

(48) It was believed that [PRO shaving was important]. *Classical NOC*

(49) John_i thinks that it is believed that [PRO_i shaving himself is important]. *Non-local antecedent*

(50) Clinton's_i campaign believes that [PRO_i keeping his sex life under control] is necessary for electoral success. *Non-c-commanding*

(51) John_i told Mary_j [that [[PRO_{i+j} washing themselves/each other] would be fun]]. *Split NOC*

Interestingly, NOC PRO must necessarily be [+human]. Chomsky (1981) was the first to note the contrast in (52)-(55), which contain PRO_{arb} , making them a clear case of NOC. It is impossible to imagine PRO as being [-human] in these examples. (55) isn't interpreted as rocks rolling down the hill; PRO must be [+human].

(52) For it to snow all day would prevent me from going to school.

(53) *To snow all day would prevent me from going to school.

(54) It is possible for rocks to roll down the hill.

(55) It is possible to roll down the hill.

A subset of NOC is arbitrary control, are simply those in which PRO_{arb} exists. They refer to people in general. A classic example of this phenomenon might be the following Shakespearean sentence.

(56) To be or not to be - that is the question.

For these examples (57)-(60) from Bhatt & Izvorski (1998), it is difficult to find a syntactic object that controls PRO, which is why they are considered to be examples of NOC.

(57) PRO_{arb} to write haiku is fun.

(58) It is difficult PRO_{arb} to dance the tango.

(59) PRO_{arb} writing haiku is fun.

(60) PRO_{arb} dancing the tango is difficult.

Lebeaux (1984), Epstein (1984) and Bhatt & Izvorski (1998) attempt to find an antecedent for such occurrences of PRO. That is, they want to get rid of uncontrolled PRO_{arb} completely. In all of these constructions, we see that the experiencer, which is in the immediately higher clause inside the specifier of the lexical adjective head, is implicit and generic⁵, and PRO_{arb} is allowed here, in agreement with their hypothesis. So the next set of sentences should not allow PRO_{arb}:

(62) PRO_i to write haiku is fun for Gerhardt_i.

(63) It is difficult for Isabella_i PRO_i to dance the tango.

(64) PRO_i writing haiku is fun for Gerhardt_i.

(65) PRO_i dancing the tango is difficult for Isabella_i.

The problem for Bhatt & Izvorski (1998) is that the above data is not very convincing; it is in fact possible to come up with a PRO_{arb} interpretation in sentences with *tough*-predicates, which is the kind of predicate found in (63)-(66). That is, it is simply the case that this data is not comprehensive enough.

⁵They follow Berman & Szamosi (1972) and Epstein (1984) in assuming that each of these predicates necessarily have an experiencer, and agree with Pesetsky (1987)'s assertion that this embedded TP is simply phonologically deleted in sentences without infinitivals like below:

(61) This exam is easy/hard/fun/dangerous/stupid.

. Otherwise, Bhatt & Izvorski (1998)'s argument would not work, as if experiencers are not always available then PRO_{arb} may still exist.

Brody (1993) and Kawasaki (1993) both are the first to point out the possibility of PRO_{arb} in *tough*-constructions. Brody himself arrives at this result with a Principle B violation⁶; his examples are given in (66)-(67).

(66) * PRO to teach them_i math is easy for the children_i.

(67) PRO to teach them_i math is useful for the children_i

Suppose PRO also had index i if *the children* did indeed control PRO . We would have a Principle B violation. But the next sentence is grammatical. This distinction, as Brody points out, seems to be purely due to lexical differences.

Kawasaki (1993) also provides an example of a genuinely unrestricted PRO_{arb} , in which the experiencer refers to something other than the arbitrary interpretation of PRO .

(68) It is dangerous for babies [PRO_{arb} to smoke around them].

It would be useful to be able to come up with an account of the purely lexical differences that Brody notes; the approach of Bhatt & Izvorski (1998) still works with the example of *easy*, because regardless of whatever context one can pair with the predicate on the easiness scale, one can't get a PRO_{arb} interpretation. I believe that one might be to distinguish between *tough*-predicates on the easiness scale, and those which are not.

My own examples in (69)-(72) show the contrast between these classes. The first example is meant to represent any adjective that is not on the easiness scale, and how it might be possible to conceive of a scenario in which the sentence would be grammatical.⁷ The second example is meant to show that regardless of context, you cannot get a PRO_{arb} interpretation from an adjective on the easiness scale.⁸

⁶This is the condition of binding theory that pronouns must be free, or not bound, in their binding domain. In this case, the pronoun is *them*, which moves up along with the entire infinitival clause to the matrix subject position.

⁷Given that the sentences involve children and smoking in some contextually salient room, imagine the following context. Suppose that it is dangerous for children for people in general to smoke in the same room as those children. In that case, the sentence *It is dangerous for the children to smoke in the room* seems grammatical.

⁸Trying to come up with a context for this sentence is not as straightforward as the previous example.

- (69) It is dangerous/fun/interesting/delightful/awesome for the children [PRO_{arb} to smoke in the room].
- (70) *It is hard/easy/difficult/impossible/possible for the children [PRO_{arb} to smoke in the room].

However, the possible PRO_{arb} interpretation disappears if we make the overt experiencer implicit. Doing so is a completely syntactic change and has nothing to do with lexical semantics. In that case, PRO_{arb} must have the same interpretation as the implicit experiencer. It is not possible to imagine, for example, the experiencer referring to children and PRO referring to people in general.

- (71) It is dangerous/fun/interesting/delightful/awesome to smoke in the room.
- (72) It is hard/easy/difficult/impossible/possible to smoke in the room.

What all of these examples concerning PRO_{arb} is meant to show is that both lexical semantics and syntax can play a role in control. A good theory of control must be able to accommodate these two factors; many views that will be considered in the next chapter focus on only the syntactic or semantic aspect of control and fail to account for an entire kind of phenomena involving syntax or semantics.

2.3.3 Other kinds of control

A subset of control is adjunct control, where the infinitival that contains PRO is inside an adjunct.⁹ The PRO that is inside the adjunct is hence controlled from outside the adjunct. The usual case of control inside adjuncts is obligatory, which is seen in examples (73)-(75).

Suppose that the children would have to undergo some difficulty as a result of the adults smoking in the room. Maybe they would have to spend all day cleaning up cigarette smoke. Even in a context like this the sentence *It is hard for the children to smoke in the room* is not grammatical.

⁹This has implications on what kind of a theory of control we are limited to. This will be discussed in future chapters in detail, but this means that no syntactic operations can take place from outside to inside an adjunct, which is an island, impenetrable to all syntactic operations. A syntactic theory of control has to come up with a way for syntactic operations to take place at the edge of the island, which might involve the movement of PRO to Spec,CP.

(73) He called us before looking around. *Temporal clause*

(74) He ate at Chipotle to fill his stomach. *Goal clause*

(75) He stopped to think what a fool he had been. *Stimulus clause*

However, adjunct control need not be limited to OC. Williams (1992) gives the example (76), where the sentence has a NOC adjunct that is [–human], leading to ungrammaticality. My own example in (77) shows that the grammaticality of this sentence can be fixed if PRO is made [+human].

(76) *The open window_i proves that [before PRO_i breaking], it was raining.

(77) The open window proves that [before PRO_i jumping], he_i was happy.

Kawasaki (1993) provides more examples of NOC adjuncts in (78)-(80), in which PRO is forced to have a pragmatically odd [+human] reading because they are necessarily cases of NOC. (80) is perhaps less pragmatically odd than the (78) and (79).

(78) [After PRO_{arb} being spoiled in a fridge], there is nothing even a good cook can do.

(79) The government abolished [PRO_{arb} having to be surrounded by fences].

(80) I read stories about [PRO_{arb} falling off a cliff].

Another phenomenon within obligatory control is noted by Polinsky & Potsdam (2002), in which an overt DP is controlled, rather than the usual case of being the controller, and the controller position is empty. This is called backward control.¹⁰ In Tsez, this can only happen with certain verbs, such as the aspectual verbs *begin*, *stop* and *continue*. Forward control is excluded from these kinds of verbs.

(81) Δ_i [kid-ba_i ziya b-išra] y-oq-si.
 II.ABS girl.II-ERG cow.III.ABS III-feed.INF II-begin-PAST.EVID
 'The girl began to feed the cow.'

Tsez

¹⁰The idea that backward control exists is not unique to Tsez. Other languages, such as Portuguese according to Farrell (1995) and Japanese in Fujii (2006), have been argued to have backward control as well. However, these cases are not anywhere near as uncontroversial.

The embedded verb *feed*, bears the agreement marker of its absolutive argument *cow*. But surprisingly, even though Tsez is a language in which verbs do not agree with non-absolutive arguments, the matrix verb bears the agreement marker of the ergative subject *girl*. According to Polinsky & Potsdam (2002), this means that either there is an exceptional agreement here, which would be *ad hoc*, or there is an unpronounced, syntactic and semantically significant subject. The ergative agreement marker arises as a result of agreement with the silent absolutive subject.

Finally, in some languages, the controlled position is spelled out, so that an overt DP is again controlled, but instead of an empty controller as in backward control, there is a copy. Lee (2003) presents (82) as a case of copy control. Landau (2013) notes that both of these backward and copy control pass the test for being kinds of OC control.

- (82) R-càà'z Lia Paamm [g-ahcnèe Lia Paamm Gye'eihly].
 HAB-want FEM Pam IRR-help FEM Pam Mike
 'Pam wants to help Mike.' San Lucas Quiavini Zapotec

2.4 *Tough*-predicates: raising or control?

An assumption that will be made throughout this thesis is the idea is that *tough*-predicates are control predicates; that is, whenever we see a *tough*-predicate with an infinitival, it will contain a PRO and not involve Movement. This conclusion will be further argued for in this section, which shows that *tough*-predicates involve CP infinitives and not TP infinitives, hence involving control, which was concluded in 2.2.

A *tough*-predicate is one in which the matrix subject is the object of the embedded verb in the infinitival. As seen in (83)-(86), one could also insert an expletive into matrix subject position rather than the object of the embedded verb.

- (83) It is fun/annoying/entertaining/torture to play The Legend of Zelda.
 (84) The Legend of Zelda is fun/annoying/entertaining/torture to play t.
 (85) It is easy/hard/possible/impossible to get As in linguistics courses.

(86) Linguistics courses are easy/hard/possible/impossible to get As in t.

A reason to believe that *tough*-predicates are raising predicates is because they do not seem to assign θ -roles to their subject, because they allow the expletive constructions as seen above, in which the expletives are meaningless. By definition, if raising predicates are those which do not assign an external θ -role, then *tough*-predicates must be raising predicates. They also pass the idiom test for raising predicates, as seen in (87).

(87) It is easy to kick the bucket.

But we need not limit ourselves to such a narrow definition of raising in which raising predicates are only those which do not assign an external θ -role. They can also be those which assign an experiencer θ -role, and the experiencer may control PRO. The original argument for the existence of PRO was, after all, based on the flawed θ -Criterion. In a sentence as follows, *John* receives an experiencer θ -role from *easy*.

(88) It is easy for John to kick the bucket.

Pesetsky (1987) notes in the reproduced examples (89)-(90) and (91)-(92) the following contrast. Verbs with experiencer θ -roles have obligatory control between the experiencer and PRO when *tough*-movement applies, which can occur together with control.

(89) These stories_j pleased me_i [PRO_i to listen to t_j].

(90) War_j frightens me_i [PRO_i to think about t_j].

Meanwhile, *tough*-movement across verbs that do not have experiencers fail.

(91) *Mary_j sued Sue_i [PRO_i to prove a point to t_j].

(92) *Bill_j kicked me_i [PRO_i to have a look at t_j].

All *tough*-adjectives seem to have experiencers available, which seems to indicate the availability of PRO when an experiencer θ -role is assigned. Based on the original arguments involving the θ -Criterion, since raising would involve the experiencer receiving two θ -roles, this is evidence for the existence of PRO.

Another reason, unrelated to the θ -Criterion, to believe that *tough*-predicates involve control is due to illicit *wh*-movement with *tough*-movement at the same time. For the purposes of this thesis I assume that Chomsky (1977)'s analysis of these constructions involving *wh*-movement is correct.¹¹ According to Chomsky, *tough*-constructions involve the movement of a null operator, the object of the embedded verb, to Spec,CP position, after which the matrix subject is Merged to matrix Spec,TP.

As noted earlier, control infinitives are likely made of CPs and not TPs. Chomsky provides further evidence of this by providing evidence of *wh*-movement, in which combining both *tough*- and *wh*- movement is ungrammatical. This indicates that embedded Spec,CP is already filled, so these facts would be mysterious if control infinitives were not CPs.

(93) It is easy to play these sonatas on this violin.

(94) This violin is easy to play these sonatas on.

(95) *What sonatas_i is this violin_j easy to play t_i on t_j?

¹¹*Tough*-constructions are by no means a solved problem in syntax, there are many alternate views in the literature. However, a successful account of *tough*-movement must also include some kind of *wh*-movement. Another account of *tough*-constructions that does so is Hicks (2009). For Hicks, the object of the embedded verb is a complex null operator, first conceived by Hornstein (2001) and Collins (2005a,b), containing the matrix subject. This moves to embedded Spec,CP, and because the Case of the larger null operator is checked but the Case of the matrix subject inside it is not checked, the subject moves to matrix Spec,TP.

2.5 Concluding Remarks

The idea behind this chapter was to present some data in preparation for the detailed analysis of the success of all the current theories of control. As I intend to show, although some theories succeed in accounting for some of the most interesting syntactic and semantic facts we have seen throughout this chapter, views of control tend to ignore one aspect of control while focusing on the other. There is, for example, extensive evidence that control is different from raising, and trying to be as theoretically minimalist as possible will simply lead to an ignorance of the empirical facts in natural language.

Control is a diverse phenomenon in which syntax and semantics may both play a role in the kinds of control that we see, ranging from subject to object control and the different kinds of obligatory and non-obligatory control. Any successful theory of control must be able to account for these empirical phenomena.

3 Theories of Control

3.1 Chapter Overview

The goal of this chapter is to introduce the reader to the different approaches to control. Section 2 goes over the historical Equi-NP deletion approach, while also giving the generic control treatment that would be taught in an introduction to syntax course.

Section 3, 4, 5 and 6 go over the more advanced theories of control, all of which have defenders today. Section 3 considers perhaps the most popular control as raising. The conclusion is that control as raising is the most empirically and theoretically inadequate approach to control. Section 4 and 5 go over the control as binding and control as predication approaches, respectively, concluding that both approaches suffer from a one-dimensional explanation of the facts.

Section 6 covers Landau (1999)'s control as Agree approach, which is the most explanatory approach to control to date. While giving importance to both syntax and semantics, Landau does so at the cost of being unable to account for kinds of control such as split, backward, copy and adjunct control. A strong theory of control has to be able to provide a very general approach, while giving importance to both syntax and semantics.

3.2 Historical Approaches

As we saw in the previous chapter, control is complicated: among other things, PRO need not refer to only the controller, PRO may itself be the controller, and the position of the controller may vary depending on semantics. More generally speaking, the controller(s) of PRO may vary depending on both syntax and semantics. A strong theory of control, then, ought to be a theory incorporating elements of both syntax and semantics, and not a one-dimensional approach.

To gain a general understanding of how theories of control have evolved since control was first discovered, it is important to look back. The very first theory of control

was developed in Rosenbaum (1967). While we no longer have the distinction between Deep- and Surface-Structure, which was first developed in Chomsky (1965), this theory was based on that distinction. For Rosenbaum, a sentence with control such as (96) is derived from (97) in Deep-Structure via deletion.

(96) John preferred to eat at Chipotle.

(97) John preferred ~~John~~ to eat at Chipotle.

Presumably, this deletion must take place under identity. Otherwise, we could derive a reading of (96) which meant, for example, that John preferred for someone else to eat at Chipotle. This theory is known as Equi-NP deletion.

The similarities between this view as presented in the past and our current conception of raising are obvious. Following Chomsky (1995), we have eliminated D- and S-Structure in favor of a syntactic structure that is built from bottom-up gradually. Instead of Movement rules, we have Internal Merge, which is an application of Copy followed by an application of Merge to the root of the tree. Copies are syntactic objects that are recreated to be used again. This process then results in the deletion of the lower Copy.

Nunes (1995) gives a more modern conception of deletion, which takes place under a framework with the operation Copy, which as its name would imply, creates a copy of a syntactic object. Deletion of Copies is only permitted by the operation Chain Reduction, which takes place inside the chain, and chains are established via c-command.

Therefore, when we derive a sentence with raising such as *John seems to be eating*, this also involves a structure of the form *John seems ~~John~~ to be eating*, and deletion of a lower copy under identity. Though it was not at the time, it is possible to draw analogies between control as Equi-NP deletion and today's version of control as raising. Both approaches rely on some kind of deletion. Any counterargument against this old view would also apply to more modern accounts of control as raising.

The usual approach to control that is taught in introductory syntax books such as Carnie (2013) involves the DP PRO. It is a DP that appears in embedded Spec,TP posi-

tion that shares its index with a c-commanding DP. It is taught that there are three different kinds of DPs: pronouns, anaphors and R-expressions. Anaphors must be bound in their binding domain; pronouns must be free in theirs and R-expressions must be free regardless. PRO is a DP which has a completely mysterious existence.

To be more abstract, according to Chomsky (1981, 1986) and Manzini (1983), PRO is both [+anaphoric] (that is, it must always have an antecedent) and [+pronominal] (because it can have an arbitrary reference). This is by definition contradictory. How can it appear uncontrolled if it must, by definition, be controlled? But the arguments for its existence seem to be unquestionable, as we went over in Chapter 2. So any account of control must involve PRO.¹²

Defining PRO in terms of binding theory doesn't seem to work, then. So researchers have tried to propose that PRO is separate from binding altogether; it has to be accounted for by a separate control theory. And as we saw in Chapter 2, control is a phenomenon in which syntax and lexical semantics may both play an important role. Textbooks such as Carnie (2013) make similar claims and leave the question of what approach to control is correct unanswered. As we will see in this chapter, there is no current approach that can derive most important control phenomena.

3.3 Control is Raising

Perhaps the most well-known theory of control in the minimalist tradition is provided in Hornstein (1999). Part of the reason for its popularity is due to its apparent simplicity and attempt to eliminate theoretically undesirable portions of syntax. Though this approach purports to be minimalist, the elimination of PRO actually leads to more questions than answers, and risks becoming far more complex than it would have been with PRO. Due to its popularity, this is the primary theory of control that will be discussed in this chapter.

¹²The nature of PRO will be discussed in greater detail in Chapter 5.

Hornstein (1999) argues that control is Movement and hence, no different than raising. Hornstein reconsiders the original reason for the existence of PRO, which is the θ -Criterion. The previous chapter discussed in detail why we need some form of θ -Criterion, in which each DP can receive only one θ -role. This is to avoid (98) having the same meaning as (99).

(98) Mary sent John.

(99) Mary sent John to himself.

But by changing a part of the θ -Criterion which says that *Each argument must receive exactly one θ -role* to *Each argument must receive at least one θ -role*, we could make the structures of these two sentences look very similar, apart from the θ -roles assigned, and get rid of PRO.

The existence of PRO is a troubled one. Since Chomsky (1981, 1986) and Manzini (1983)'s treatment of PRO in which its referent is determined by an antecedent, it has been a goal of syntactic analysis to find an antecedent for occurrences of PRO which do not seem to be controlled. But these attempts have failed, as noted in Chapter 2. Genuine cases of PRO_{arb} do exist.

(100) It is dangerous for babies [PRO_{arb} to smoke around them].

Given that PRO is a dubious theoretical construct, it would of course be theoretically preferable to eliminate PRO entirely from our theory of grammar. Therefore, Hornstein's intentions are certainly well-founded.

θ -theory itself is reduced to Agreement, in which receiving a θ -role is merely to check the thematic feature of a predicate. Hornstein wants Movement to a θ -position to obey requirements on locality, and to conform to syntactic requirements like Greed, which says that a syntactic object A only enters a syntactic operation to satisfy features of itself.

Another desirable result is that the controller must c-command the controllee, since Movement targets c-commanding landing sites, due to the aforementioned process

of Chain Reduction. A simple sentence with control is derived exactly as we would expect, by raising.

(101) John tried ~~John~~ to eat an apple.

The only difference with raising structures is that *John* also checks the external θ -role of the verb *tried*, meaning it has two θ -roles.

The strength of Hornstein's approach is in the concept rather than the execution. Using newly-made minimalist tools to eliminate the incredibly troubled existence of PRO and make the derivation of control barely any different from raising, Hornstein is indeed able to simplify, at least at first glance, a very complicated phenomenon. As the minimalist approach of Chomsky (1995) exists almost entirely to avoid objections based on Occam's razor, this attempt is well-founded in theory.

3.3.1 Problems

The problems for Hornstein begin, however, when we look at almost any empirical fact that differs from the usual textbook distinction of control vs. raising. For contexts with optional control, he posits the existence of a little *pro*, found in languages like Turkish and Italian to explain the existence of sentences with no overt subjects.

(102) It is dangerous for babies [*pro* to smoke around them].

(103) Git-ti-m.
Go.PST.1SG
'I went.'

Turkish

There are a few problems with this proposal. First, *pro* is supposed to get Case in all other contexts in which it appears. In Turkish and in Italian and other languages in which it appears, it is in matrix Spec,TP position and receives nominative Case.¹³ But embedded infinitival Spec,TP is a well known position in which no Case is assigned.

¹³Jaklin Kornfilt (p.c.) points out that *pro* can receive genitive case in the subject position of a nominalized embedded clause.

How is it receiving Case? If we assume that embedded Spec,TP can be assigned nominative Case, then we would have to assume that in control sentences, *John* checks nominative Case twice.

Second, Hornstein will have to come up with an explanation for why *pro* can be in nonfinite clauses without Case but nowhere else in English, and why it can only be in finite clauses with Case in other languages. In other words, why can't we say the sentence below in English:

(104) *Went. (Meaning I went, you went or someone went).

Moving to other issues, Landau (2013) cites multiple cases in (105)-(109) in which Hornstein's view overgenerates. First consider passivization of the embedded subject. The first two sentences are both good after passivization, but when *hate* is passivized, it's ungrammatical.

(105) I believe John to live like that.

(106) John was believed to live like that.

(107) *John was hated to live like that.

Again, nothing in the control as Movement theory tells us why it's unacceptable. It's because of the different properties of the verb, and the control as Movement view cannot distinguish between the different properties of verbs and predicates.

Next, consider implicit control. Nothing blocks the Movement of *John* from the subject of *return later* to the embedded Spec,TP position, to the object position of *said*, to the subject position of *said*, and finally to the matrix Spec,TP position.

(108) John said to return later. (good if John said to someone else, to return later, so it controls PRO)

(109) *John said to return later. (if the meaning is John said to himself to return later)

What seems to be wrong about (109) is the number of θ -roles *John* receives: it receives

three, and that makes the sentence confusing and awkward to read. This might be taken to be evidence in favor of the θ -Criterion that Hornstein rejects.¹⁴

Landau (2013) also notes cases of undergeneration, which involve partial and split control. Hornstein makes no attempt to derive partial control as seen below:

(112) He_i wanted PRO_{i+} to play games together.

There is no way to derive *He* in Spec,TP position from an embedded Spec,TP DP with the index $i+k$ by using Copy and Merge. Also consider cases of split control:

(113) John_i promised Mary_k PRO_{i+k} to get married to each other.

Again, it is not clear how this sentence would be derived by applications of Copy and Merge. The account also cannot derive control involving *wh*-objects, in which the subject of the infinitival cannot be interpreted as a question-word.

(114) Who wants [~~who~~ to leave]?

As mentioned previously in Chapter 2, Sigurðsson (1991) shows that PRO does actually receive Case in Icelandic control with examples of floating quantifiers, but not in raising. Movement would result in Case mismatch.

(115) Strákarnir_i vonast til [að PRO_i vanta ekki alla í skólann]
 the.boys.NOM hope for to PRO.ACC to.lack not all.ACC in the.school
 'The boys hope not to be all absent from school.'

(116) Strákana virðast [t_i vanta ekki alla í skólann]
 the.boys.ACC seem t to.lack not all.ACC in the.school
 'The boys hope not to be all absent from school.'

¹⁴In favor of eliminating the Criterion that is not related to minimalist reasons, Hornstein gives the following example of a sentence which is derived by Movement of a DP from one θ -position to another. The DP receives both the external and internal θ -roles of *wash*.

(110) Mary washed.

This conclusion might overgenerate, given that some verbs that involve movement like this and two θ -roles are ungrammatical.

(111) *Mary ate. (meaning Mary ate herself)

Admittedly, the judgment here is not so clear. This may be due to pragmatic reasons involving the grossness of cannibalism rather than a principled syntactic reason on its ungrammaticality.

Also mentioned in the previous chapter, Landau gives us strong reason to believe that because languages like Hebrew allow complementizers to attach to control infinitives but not raising infinitives, all control infinitives are actually CPs rather than TPs, which this approach cannot account for.

- (117) Rina_i xadla [(me-) PRO_i le'acben et Gil].
 Rina stopped (from-) PRO to.irritate ACC Gil
 'Rina stopped irritating Gil.'

- (118) Ha-muzika ha-ro'ešet_i xadla [(**me-*) t_i le'acben et Gil].
 the-music the-noisy stopped (**from-*) t_i to.irritate ACC Gil
 'The loud music stopped irritating Gil.'

Hebrew

In addition, Chomsky's aforementioned approach to *tough*-constructions as involving embedded CPs precludes the idea that control infinitives are mere TPs.

- (119) It is easy to play these sonatas on this violin.
 (120) This violin is easy to play these sonatas on.
 (121) *What sonatas_i is this violin_j easy to play t_i on t_j?

Finally, and perhaps most importantly, Hornstein's account of control as raising is completely one-sided, in that it claims that control is purely a syntactic phenomena. This is clearly not the case. As mentioned in the previous chapter, Culicover & Jackendoff's reason why *promise* involves subject control is due to the semantic role of Source.

- (122) John's promise/vow/offer/guarantee/obligation/pledge/oath/commitment to Susan to take care of himself/**herself*
 (123) John's order/instructions/reminder/encouragement/invitation to Susan to take care of **himself*/herself

Further, deriving the existence of a sentence like *John promised Mary to go to Chipotle* involves a violation of some version of the Minimal Distance Principle, which says, to be very broad, that syntactic operations must take place with the nearest syntactic object. Movement cannot go past the c-commanding *Mary*.

As mentioned before, Landau (1999) notes that the property involved in whether partial control is licensed or not is semantic tense, which Hornstein's one-sided view cannot account for.

(124) *John_i managed [PRO_{i+} to gather at 6].

(125) The chair_i preferred [PRO_{i+} to gather at 6].

Finally, this approach fails to account for the difference in control between adjectives on the easiness scale and those which are not, which is a semantic fact rather than a syntactic fact. The sentences below are syntactically identical, but there is a contrast.

(126) It is dangerous/fun/interesting/delightful/awesome for the children [PRO_{arb} to smoke in the room].

(127) *It is hard/easy/difficult/impossible/possible for the children [PRO_{arb} to smoke in the room].

Hornstein tries to remove a dubious and confusing theoretical construct in syntax, and his philosophy is on the right track. We definitely do want to remove unnecessary and questionable aspects of our syntactic theory as much as possible. However, the evidence for the existence of PRO is too strong, since reducing control to Movement leads to numerous devastating problems.

3.4 Control is Binding

Conceiving control as binding is an attempt to simplify phenomena that may, at first glance, seem similar to general cases of binding. But rather than reducing control to raising, this approach attempts to reduce control to binding.

As previously noted, researchers such as Manzini and Chomsky have attempted to define PRO in terms of [anaphoric] and [pronomial] features, both of which were used to build binding theory. An anaphor would be [+anaphoric, –pronomial], because it must be bound in its domain. A pronoun would be [–anaphoric, +pronomial], because

it must be free inside its domain. Finally, an R-expression (any other noun phrase such as a proper name) must be [–anaphoric, –pronomial], meaning it must be free, period. One then might predict the existence of PRO, which seems to be both [+anaphoric, +pronomial], but that is self-contradictory. As we will see, solutions to this problem involve defining contexts where PRO may not be controlled.

Generally speaking, according to the control as binding approach, PRO, at least in OC contexts, is a null anaphor that is bound to its controller. As Landau (2013) points out, the binding domain for PRO must then be different from that of an overt anaphor, because it extends from an embedded to a matrix clause, as seen in his examples below in (128)-(129).

(128) John_i hoped [PRO_i to impress his roommates].

(129) *John_i hoped [that himself_i would impress his roommates].

For Manzini (1983), this distinction is derived by assuming that an anaphor that does not have a governing category must be bound in the category which has an accessible subject, or its c-domain. This is called its domain-governing category.

For Manzini, the distinction between OC and NOC PRO is due to differences in their binding domains. OC PRO must have a controller in the matrix clause, so their binding domain extends to that. However, NOC PRO does not have a binding domain at all, and according to her, is then exempt from Condition A of binding theory.

Lebeaux (1984) instead attempts to assume that null and overt anaphors have different binding domains by definition. Overt anaphors have the same binding domain as normally assumed, but null anaphors are bound in the minimal TP containing the c-domain (minimal maximal projection which has the anaphor) and its governor. The idea that merely the phonological content of a syntactic object can change the size of its binding domain may seem like a troubling and ad hoc conclusion.

The third and final approach to control as binding to be considered in this chapter is that of Koster (1984), which looks at some data in Dutch, given below in (130)-(131). For

Koster, an ungoverned PRO is a pronoun, leading to NOC, and an OC complement is a TP rather than a CP.

In Dutch, which is an SOV language, the verb *proberen*, meaning *try*, can optionally select a complementizer *-om*. This makes an expletive-construction involving the control predicate *try* grammatical in Dutch, as seen in (130). Complements to the right of the verb may have complementizers. But complements to the left of the verb never do, making (131) ungrammatical, because it cannot accept an optional complementizer.

- (130) Er werd t_i geprobeerd [(om) PRO Bill te bezoeken]_i
 there was t_i tried COMP PRO Bill to visit
 'It was tried to visit Bill.'

- (131) Er werd [PRO Bill t_i] geprobeerd te bezoeken_i
 there was PRO Bill t_i tried to visit
 'It was tried to visit Bill.'

Due to this paradigm, Koster argues that (130) involves NOC, and it cannot be governed because it is inside a CP, and it therefore does not need to be bound. (131) is an instance of OC. There are contexts in Dutch in which OC is grammatical, as seen in Koster's example (132). This infinitive is OC because it can be governed; a complementizer is ungrammatical in the sentence below because it is a TP.

- (132) Zij had [(**om*) PRO het boek t_i] probeerde te lezen_i
 she had (**COMP*) PRO the book t_i tried to read
 'She tried to read the book.'

Similarly to the control as Movement approach, the binding approach also suffers from the same issues of only accounting for syntactic phenomena in control. Lasnik (1992) points out that in obligatory control, the verb is what determines the argument that is the controller, while binding cannot be determined by thematic restrictions. Though Manzini (1983) admits that controller choice is sensitive to semantics, if control is binding and binding isn't supposed to be influenced by semantics, then the contrast below is left unexplained.

(133) John_i told Mary_j about himself_i/herself_j.

(134) John_i told Mary_j [PRO_{i/*j} to leave].

Landau (2013) also argues that binding and control must be separate phenomena, given that binding does not allow split antecedents while control does.

(135) *John_i showed Mary_j to themselves_{i+j}.

(136) John_i proposed to Mary_j [PRO_{i+j} to buy themselves_{i+j} a new car].

Finally, he points out that implicit arguments can control but not bind.

(137) Mary_i thought that John_j said (to her_i) [PRO_i to wash herself].

(138) Mary_i thought that John_j talked *(to her_i) about herself_i.

Similarly to the raising approach, the binding as control approach has good intentions, in attempting to simplify the overly complicated problem that is control. However, the empirical facts make it clear that control and binding may be separate facts entirely. I revisit this conclusion in Chapter 5. Seeing control as binding may be more palatable once we point out that control as binding approaches have all been developed in the 1980s, and we have had new theoretical tools developed since then. In particular, one could imagine binding theory in terms of Agree. Though I leave this question open, some synthesis between control as Agree and control as binding (if binding is construed as Agree) may be possible.

3.5 Control as Predication

The predication approach to control was originally developed as the "formal semantics" approach. For Chierchia (1984), a sentence such as *John tried to eat at Chipotle* means something like "in all possible worlds where John attempted to try to do something, he had the property of eating at Chipotle." In this approach, what is being "controlled" is not PRO per se, rather it is the entire embedded infinitival which PRO is supposed to be in. Further, the infinitival is assumed to be a VP without PRO.

Chierchia believes that control is associated with certain verbs, and it arises as a lexical entailment. Each infinitival, VP, is a one-place function that is mapped to controllers. In the case of non-obligatory control, there is simply no lexical entailment. Chierchia's evidence for this approach is based on the following data. First, the only conclusion that follows is that Nando likes to play tennis too, not that Nando likes Ezio's tennis play.

(139) Nando likes everything Ezio likes.

(140) Ezio likes playing tennis.

(141) Therefore, Nando likes playing tennis.

The only possible interpretation of *it* in (142) is that Nando practiced playing tennis, not that Nando practiced Ezio's playing of tennis, which does not make sense.

(142) Ezio practiced playing tennis for a year and Nando practiced it for a month.

To be more abstract, Chierchia first posits the existence of a hierarchy of θ -roles, which may vary in the case of the subject control predicate *promise*.

(143) Theme > Goal > Agent

Next, he posits the following entailment:

(144) $E(B_r [P]) \rightarrow E(B_r [P/P^*(\theta(B))])$

B is the matrix predicate, and P is the infinitival predicate. B is an r-eventuality (an eventuality of type r) that takes P as an argument. An r-eventuality is obtained in which P is replaced by the ordered pair $\langle P, x \rangle$. "x" bears a θ -role with respect to B. θ , a partial function from an eventuality to a participant, delivers the controller.

This will be illustrated with the example *John tried to eat*. B is the predicate *try* and P is the infinitival predicate *eat*. The partial function, θ , delivers the agent *John* when it takes B as an argument. This gives us the ordered pair $\langle \text{eat}, \text{John} \rangle$, which is what control is according to Chierchia.

In doing so, Chierchia provides an account that gives explanations for the semantic facts in control that we have seen previously. It is the only approach that has been considered so far to give a solution to the Minimal Distance Principle problem involving *promise*, by claiming that this verb involves a different hierarchy of θ -roles.

The problem with this approach is that its syntactic approach is not well-developed, in particular because it does not posit the existence of PRO or layers above VP in the infinitival complement. Given that this approach does not posit the existence of PRO, it cannot begin to account the aforementioned cases of partial and split control in the previous sections.

Although it might be able to account for the fact that only predicates with semantic tense allow partial control, it cannot tell us how a reading of partial control is derived given that there is no PRO. Chierchia's function delivers the "controller," but it does not tell us why the infinitival predicate is interpreted as a group containing more than just the controller. For split control, at least in this version of the entailment, Chierchia's function cannot give us more than one controller.¹⁵

In addition, because it posits that the infinitive is a bare VP, the reason why there is evidence of *wh*-movement in *tough*-constructions, as well as complementizers attaching to Hebrew control infinitives is mysterious, and this fact can only be explained if control infinitives are clauses, not bare verb phrases. Furthermore, it is not clear how PRO can get visible Case in Icelandic if it does not exist. Finally, the existence of backward control seems to be impossible under this approach, since PRO does not exist and the θ -function delivers the controller, which is PRO in backward control.

¹⁵But it might be possible to imagine a different entailment for the control predicates that do allow split control, in which the θ -function might be able to deliver a set containing both of the controllers rather than just one.

3.6 Control as Agree

The final approach to control that will be considered in this chapter is, along with control as raising, the most modern one. It also uses the tools provided by Chomsky's minimalist program, but rather than eliminating the θ -Criterion, it tries to reduce control to the syntactic operation Agree.¹⁶ In particular, the matrix probe Agrees with an embedded goal, in which the probe is a functional head and the goal is PRO or the embedded C in control infinitives, which are made of CPs.

This approach was first conceived of by Landau (1999) in order to explain two kinds of control, partial and finite. Three kinds of features exist: [Agr], [T] and [R]. [+Agr] specifies overt agreement while [−Agr] specifies implicit agreement. [+T] specifies the presence of semantic tense, found in partial control predicates. [−T] is its absence. These two features are found on T_0 and C_0 . [+R] is found on DPs which are referentially independent, such as R-expressions, while [−R] is found on DPs which are dependent, such as PRO and anaphors.

Landau posits the existence of the following rules to put uninterpretable [R] features to drive Agree on probes; if the probe does not possess [T] or [Agr] features the rule does not apply.

(145) $[+T, +Agr] \rightarrow [+T, +Agr, +R]$ if both T and Agr are +

(146) $[T, Agr] \rightarrow [T, Agr, -R]$ if one of T or Agr is −

The first rule implies that a probe with those features requires a local referentially dependent DP to check off its uninterpretable [+R]. Similarly, the second rule implies that a probe with those features requires a local PRO to check off its uninterpretable [−R] feature. The "interesting generalization that emerges is that "fully specified clauses" – typically, indicatives – would never exhibit OC, but any type of "partially specified" clause might. This reverses the traditional view, by which PRO-environments form a

¹⁶This operation will be further elaborated in Chapter 4.

natural class defined by a single syntactic criterion (e.g., ungoverned, null case, no case etc.)" (Landau, 2013, p.67). So an advantage of this approach is that PRO can bear Case, as seen in previous examples of Icelandic.

Partial control now has an excellent elaboration. PC complements have C with the feature [+T], signifying semantic tense, while non-PC (exhaustive control, EC) complements have no semantic tense, or [−T]. EC complements are not specified for [Agr], so it is not a possible goal for Agree, but PC is. Landau believes that Agree ignores the feature [semantic plurality] on PRO that distinguishes it from its controller, so it makes no difference.

Landau is the first to try and synthesize both semantic and syntactic facts in control by coming up with features such as [+T]. However, while it provides a strong explanation of partial control, it does not do so for split control, a closely related phenomenon. In addition, it also cannot derive backward, copy and control inside islands (adjuncts and subjects). Finally, if adjuncts may involve OC, this would be troublesome for this approach as all adjuncts are NOC due to being islands for Agree.

3.7 Concluding Remarks

Multiple of the most well-known approaches to control theory were considered. All of these approaches have their advantages: control as raising, binding and predication all attempt to reduce control theory to something else, and try to come up with explanations for the troubled existence of PRO. Landau's control as Agree, meanwhile, provides a very well-developed way of accounting for partial control and finite control, while giving importance to both syntax and semantics.

But all of these approaches account only for subsets of the phenomena seen in Chapter 2, while being unable to derive much of it. In particular, the existence of split control seems to trouble all of these theories. But we can learn from Landau's successes in his attempts to derive a significant chunk of control theory, as I try to come up with an alternate way to derive control as Agree in Chapter 4.

4 Deriving Obligatory Control from Syntax and Semantics

4.1 Chapter Overview

This chapter introduces the reader to the theory of control advocated by this thesis. It is one that is mostly based on the operation Agree between the control predicate and the controllee, usually PRO, and the controller: these two Agree steps establish control when the set containing the index of the controller is a subset of the set containing the index of the controllee and the semantics is satisfied at LF.

Section 2 establishes some components of this theory of control, adding features to drive Agreement, a semantic foundation based on Farkas (1988), a control calculus to ensure that obligatory control exists and the use of the subset relation instead of a strict identity relation between the indexes of the controller and the controllee. This is necessary due to the existence of partial control, in which the indexes are not equal. Section 3 derives the structures of the following control constructions: subject control, object control, subject control across a DP, control shift, partial, split, backward and copy control.

The intention is to introduce the reader to a theory of control which has two main advantages. The first is that it can derive many control constructions, including the unsolved split control construction, and does not focus on deriving just one aspect of control theory. The second is that this theory of control, unlike others, gives importance to both syntax and semantics in establishing control, which a strong theory must include.

4.2 Preliminaries

The overall idea behind the theory of control as presented in this thesis is that the predicate first Agrees with the controllee with the use of specific unvalued features on the predicate, and it then Agrees with the controller. The narrow syntax is able to keep track

of the indexes of the controllee and controller with the *control calculus*, which is paired to each control predicate. This information is maintained after Transfer to LF. In LF, if the set containing the index of the controller is a subset of the set containing the index of the controllee, and if all the relevant semantics of the controllee and the controller is satisfied, the derivation is grammatical. Otherwise, it crashes. This process is only present with obligatory control.

The three components of the control module in natural language according to this thesis are given below.

- (147) The features: PRO, and other referentially dependent DPs, possess the feature $[-R]$. Referentially independent DPs such as R-expressions possess the feature $[+R]$.¹⁷ The control predicate possesses two unvalued features: $[u+R]$ to Probe for the controller and $[u-R]$ to Probe for the controllee.
- (148) The control calculus: Each control predicate possesses a control calculus, a mechanism that keeps track of the index of the controller and the controllee. In LF, the control calculus pays attention to the lexical semantics of the control predicate.
- (149) The subset relation: For a controller(s) of index x and a controllee of index y : if $\{x\} \subseteq \{y\}$ in the control calculus then the derivation moves to LF.

Another component that is assumed to be independent of the control module, that might be a part of the binding module, is given in (150). This component is needed for the control calculus to keep track of the index of each DP that the predicate Probes for.¹⁸

- (150) Index Feature Formation Rule: For any syntactic object with index i , it has the syntactic feature $[i]$.

The reasoning behind (147) is simple. The operation Agree is used to capture Hornstein (1999) and Williams (1980)'s intuitions that obligatory control involves c-commanding

¹⁷This idea was originally conceived of by Landau (1999).

¹⁸Future research may show how such a rule could be used to derive binding theory alongside control theory, making it possible to unify binding and control both as an Agree approach.

antecedents.¹⁹ Features force the predicate to Probe for the c-commanded controllee and controller. The index feature present on these DPs allows the control calculus in (148) to keep track of it.

Perhaps the most controversial yet most important is (148), which is a mechanism that is paired to each obligatory control predicate. It is present in the narrow syntax and it is intimately related to the lexical semantics of each control predicate. The control calculus may be represented with the following table.

	Index 1:	\emptyset / θ
(151)	Index 2:	\emptyset / θ
	Control:	$\{\emptyset_2\} \subseteq \{\emptyset_1\}$

The control calculus possesses two empty slots for index features; in the case of predicates which take a subject and an object—this includes cases such as control with *promise*, control shift and split control—it possesses three empty slots. It is filled by the index features of potential controllees and controllers, and the semantic acceptability of these is determined in LF. Some conception of an order may be necessary: naturally, it is assumed that the first slot is filled by the index of the first Probe and the second slot is filled by the index of the second Probe.

The semantic acceptability of a given index is determined by the semantic role that the slot is paired with.²⁰ The relevant semantic roles are from another theory of control, but one that is purely semantic, in this case by Farkas (1988).

Farkas argues for a semantic notion of Responsibility (RESP): $\text{RESP}(i,s)$ holds between an initiator i and a situation s just in case i brings about s . An example is given in the following sentences: Mary is responsible for both of the situations, that is, taking out the trash, in the infinitival, given that object control is in (152) and subject control is in (153) and we associate Mary with both situations.

¹⁹Since, if A c-commands B and B c-commands C, then A c-commands C. Therefore the controller c-commands the controllee.

²⁰Here, I do not need to assume an *ad hoc* syntactic version of the θ -Criterion.

(152) John persuaded Mary to take out the trash.

(153) Mary promised John to take out the trash.

While one may argue that a semantic relation solely for a theory of control is *ad hoc*, Farkas shows that this relation is independent of control, having an importance in deriving grammaticality in rationale clauses, sentences with *intentionally*, and positive imperatives. This is seen in the examples (154)-(159).

(154) The shop window has a big sale sign in order to attract customers.

(155) *John resembles his father in order to annoy his grandmother.

(156) John was intentionally seen by the best specialist.

(157) *John was intentionally watched by his neighbors.

(158) Be polite!

(159) *Be tall!

Farkas assumes that the controller must have a responsibility relation to the situation described in the infinitival. However, the controllee need not have a specific semantic relation to the situation in the infinitival. PRO need not be the Agent of a situation; for example, in *John tried to be happy*, PRO is the experiencer but *John* is still the initiator of the situation *be happy*.

With this semantic background in hand, we can start moving towards a theory of control that incorporates both syntax and semantics. I assume that each empty slot for an index is paired with a semantic role. I posit the existence of the following control calculus for generic control predicates such as *try* which do not have objects.²¹

	Index 1:	\emptyset_1 / θ
(160)	Index 2:	$\emptyset_2 / \text{RESP}$
	Control:	$\{\text{RESP}\} \subseteq \{\theta\}$

²¹As we will see later in this chapter, there are three slots in the control calculus for indexes when a predicate can take two DP arguments. Such a control calculus will be shown in the upcoming sections.

This control calculus ensures that the first index slot, belonging to PRO, can have any θ -role, whereas the controller is responsible for the situation in the infinitival. Once the slots are filled and after the derivation is moved to LF, the grammar checks to see if the subset relation is fulfilled along with the semantics of each DP as represented in the calculus. If it is, the derivation proceeds, and if not, the derivation crashes.²² This accounts for the non-control shift cases of control.

Landau (2013) argues that the role of syntax in Farkas's account is completely accidental and not motivated at all, with the following sentence. It is an accident that PRO cannot refer to Harry.

- (161) Harry₁ knew that Fred₂ owed some money to Richard, so he₁ gave him₂ a loan to settle this. Fred₂ then promised Richard [PRO_{*1/2} to pay back his debt].

My syntactic approach solves Landau's problem, by combining Farkas's approach and the Agree operation. In this case it is not coincidental, it is expected given the local nature of Agree.

The semantic relation in control shift is slightly different. Instead of the initiator, it is the person whose actions are *determined* by the initiator. She terms this relation A(i, x). In the following example, *John's* actions are determined by the initiator, *Mary*.

- (162) John_j persuaded Mary PRO_j to be allowed to take out the trash.

The final line of the control calculus is used to determine whether control is established. Once all slots are filled, the calculus checks whether Slot 2 \subseteq Slot 1. If this relation holds, then control is established and the derivation proceeds. If not, control is not established and the derivation crashes.

If one thinks that assuming a certain order is *ad hoc*, another way to ensure the correct

²²I leave it an open question as to where exactly this grammaticality check takes place. Does it happen in the narrow syntax as the derivation proceeds, or does it happen in the Logical Form after transfer? This would have to be determined with future research; independent evidence is needed to determine whether this ungrammaticality is syntactic or semantic. But given the idea in minimalist syntax that syntax ought to be as simple as possible, a control calculus that can make sentences ungrammatical in the narrow syntax may seem *ad hoc*. Therefore, it may be more reasonable to think that ungrammaticality arises in LF.

result can be to determine the truth of the statement $\text{Slot } 1 \subseteq \text{Slot } 2 \vee \text{Slot } 2 \subseteq \text{Slot } 1$. If one of the conjuncts is true, then the entire statement is true. This derives the same results as seen in this chapter, but for the sake of simplicity, I assume that such an order is built into the calculus.

Finally, a subset relation is used rather than strict identity due to the problems of partial and split control. A set is made up of each syntactic index feature: for [i] we get the set {i}. If the set for the index of the controller(s) is a subset for that of the controllee, the control calculus does not cause the derivation to crash. The definition of a subset is given in (163).

$$(163) \quad A \subseteq B \stackrel{\text{def}}{=} (A \subset B) \vee (A = B)$$

"=" refers to strict identity whereas " \subset " refers to a proper subset. For example, {x} is a proper subset of {x, y}. 3 definitions below are used to ensure that the checking of the subset relation goes smoothly in LF. (164) defines the set containing the index of split control PRO. (165) uses the union operation between the sets of the index of the controllers to derive the subset relation in split control. Finally, (166) defines the set containing the index of a partial control PRO, and ensures that the set containing the index of the controller is a proper subset.

$$(164) \quad \{x+y\} \stackrel{\text{def}}{=} \{x, y\}$$

$$(165) \quad \{x\} \cup \{y\} \stackrel{\text{def}}{=} \{x+y\}$$

$$(166) \quad \{x+\} \stackrel{\text{def}}{=} \{x, \dots\} \wedge |\{x+\}| > 1$$

In the case of exhaustive (not partial or split) control, the controller and PRO share the same index, so the subset relation is satisfied as the two sets are equal.

Partial control shows the need of the subset relation as opposed to strict identity between the two sets, as the index of PRO includes the index of the controller but is greater than it. Split control involves the union between the two sets containing the indexes of the controllers, which is a subset of PRO.

(167) Exhaustive control: $\{x\} \subseteq \{x\}$ because $\{x\} = \{x\}$

(168) Partial control: $\{x\} \subseteq \{x+\}$ because $\{x\} \subset \{x, \dots\}$

(169) Split control: $\{x\} \cup \{y\} \subseteq \{x+y\}$ because $\{x,y\} = \{x,y\}$

An alternative to using the union operation for split control is to individually determine if both of the sets containing the indexes of the controllers are subsets.

(170) $\{x\} \subset \{x,y\} \wedge \{y\} \subset \{x,y\}$

To conclude, these derivations apply only to cases of obligatory control. In NOC, which often involves PRO_{arb} , the control calculus and features are completely absent: although one might object to this as *ad hoc*, Chapter 5 will show that all control predicates which allow NOC have a certain lexical semantic feature that may or may not preclude these components from being present.

4.3 Derivations

With these features, the control calculus and definitions at hand, we can try deriving the simple sentence (13) below.

(171) John tried to be happy.

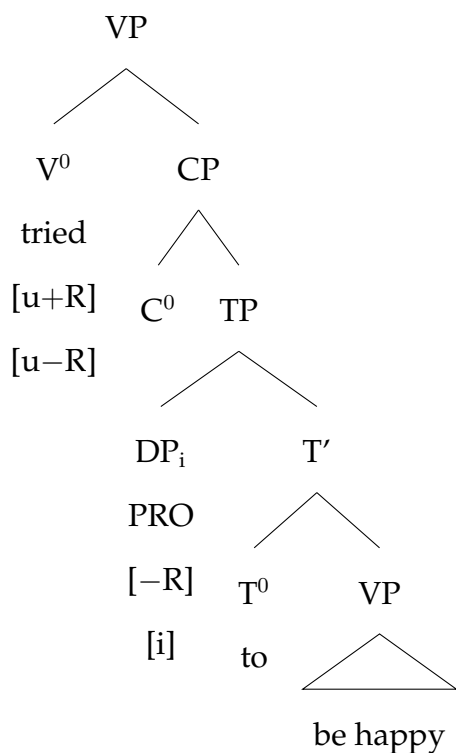
The part of the derivation that concerns us starts when the control predicate *try* takes the control infinitive, a CP as established in Chapter 2, as its complement. PRO and *try* have the following feature geometry.

(172) *try*: $[u-R], [u+R]$

(173) PRO: $[-R], [i]$

Starting with PRO, the Index Feature Formation rule creates a feature of PRO's own syntactic index, $[i]$, on PRO. Because it is an anaphor, it has the feature $[-R]$. *try* has two new features: to force Agreement with PRO, it has an unvalued $[u-R]$ feature and to Probe for the controller, it has an unvalued $[u+R]$ feature. The derivation starts in (174).

(174)



 Index 1: \emptyset_1

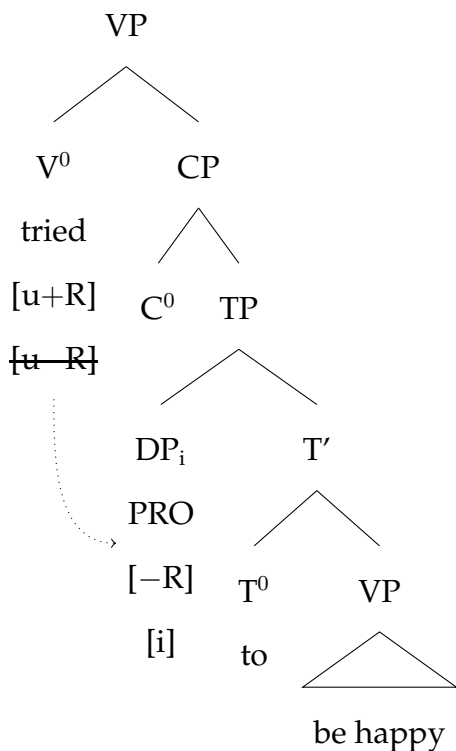
 Index 2: \emptyset_2

 Control: $\{\emptyset_2\} \subseteq \{\emptyset_1\}$

A CP phase was formed as there are no unvalued features within the CP.²³ *try* checks off its [u-R] feature with the [-R] feature of PRO. The control calculus keeps track of the index of PRO, which is *i*. Naturally, the first slot is filled with the first instance of Agree, and the second slot by the second instance.

²³As in Chomsky (2000, 2001)'s conception of phases, control infinitives are weak phases in which Transfer to PF or Transfer of LF does not take place, it is possible for Agreement from outside the phase to take place inside the phase. For a view in which weak phases allow Transfer to PF but not Transfer to LF, restricting movement but not Agreement, see Richards (2011).

(175)



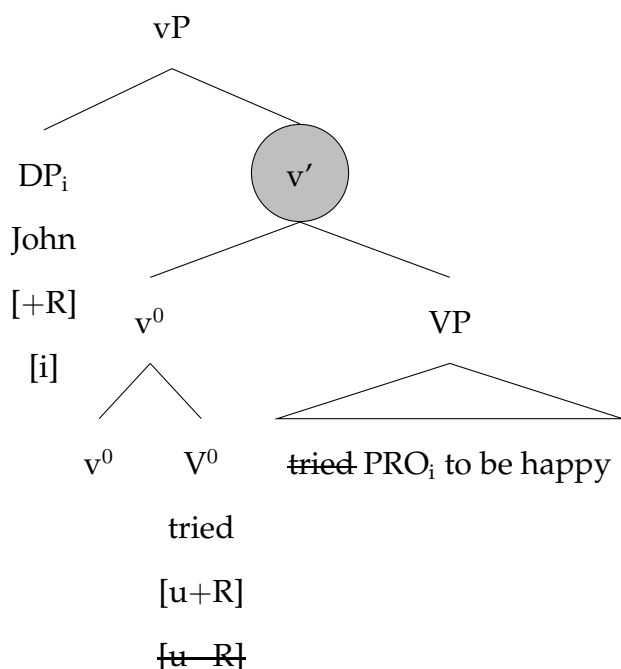
Index 1: i

Index 2: \emptyset_2 Control: $\{\emptyset_2\} \subseteq \{i\}$

The second part of the derivation that concerns us is when *try* moves up by Head Movement, conjoining to v^0 to form another v^0 , which takes on the unvalued features of *try*²⁴, which is still [u+R]. The subject John Merges to Spec,vP.

²⁴Chomsky (2000) notes that, although labels are copies of the projecting item, exceptions are made for the consequences of Agree.

(176)



Index 1: i

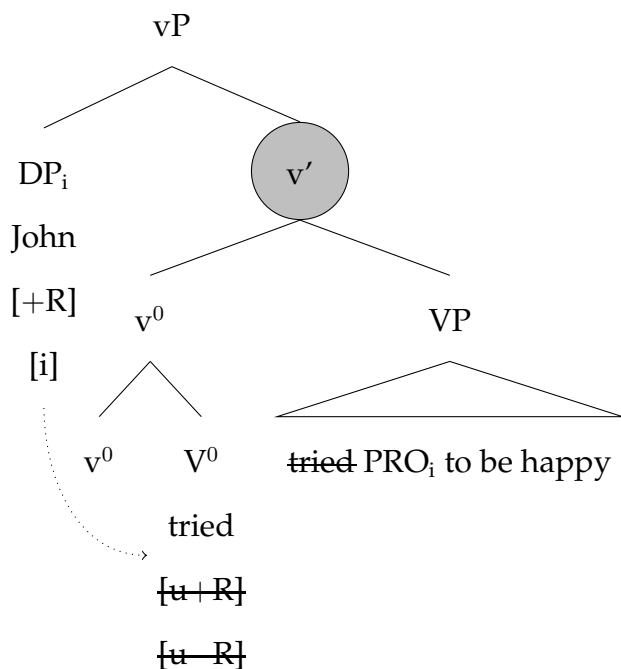
Index 2: \emptyset_2

Control: $\{\emptyset_2\} \subseteq \{i\}$

v' Probes for the subject; this is possible since both c-command each other.²⁵ This checks off the remaining unvalued features on the control predicate, and the calculus keeps track of the index of the controller, which is also i. After the derivation proceeds to LF, the calculus checks the semantic roles of the controller and the controllee and to see whether the subset relation has been established. Since all of these are satisfied, the derivation does not crash and is grammatical.

²⁵Béjar & Rezac (2009) point out that this is possible in Chomsky (1995)'s conception of Bare Phrase Structure. When v is Merged to VP it creates {v, {v, VP}}. The search space of the label v is therefore {v, VP}. Merging with the subject yields {v, {John, {v, {v, VP}}}}. The search space of v then becomes {John, v, VP}. Given how labels project in BPS and that one label of v⁰ is a nondominating sister of John, it can Probe. This label is marked with a circle on (176)-(177).

(177)



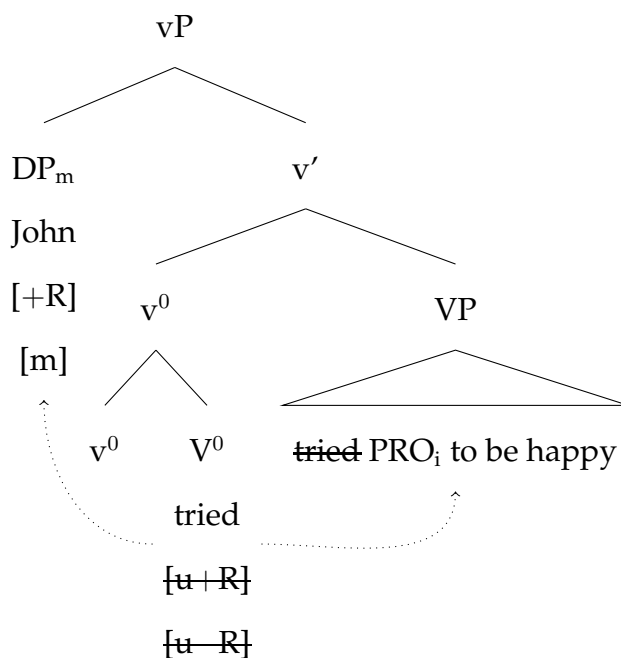
Index 1: i / EXP

Index 2: i / RESP

Control: $\{i\} \subseteq \{i\}$

What would happen if the index of the controller and PRO differed? It is assumed that this would lead to the derivation crashing because the set containing the index of the controller is not a subset of the set containing the index of PRO.

(178)



Index 1: i

Index 2: m

Control: $\{m\} \not\subseteq \{i\}$

To recap, we've seen how the usage of these features on the predicate, controller and controllee can derive simple control phenomena. Although the usage of these features may at first glance overly complicate what could be a much simpler derivation—as in Hornstein (1999) where control is just raising—this approach attempts to derive many different control structures rather than focusing on just one, showing the need for these relatively complicated features.

Furthermore, as discussed in Chapter 3, section 3.1, approaches such as Hornstein (1999) often lead to many more problems that one has to come up with much more complicated solutions to fix, even if they are simpler at first glance. The next sections will give the derivations of more complex control structures that other approaches have not been able to derive, such as split control.

4.3.1 Object control

The derivation of control in object control verbs is the point at which we have to start assuming the existence of control calculi with three empty slots rather than two. This is required given the phenomenon of control shift, subject control across a DP and split control. This thesis argues that the only difference in the derivation between these phenomena is the different structures of the control calculi, and a control calculus for each of these will be presented in this chapter.

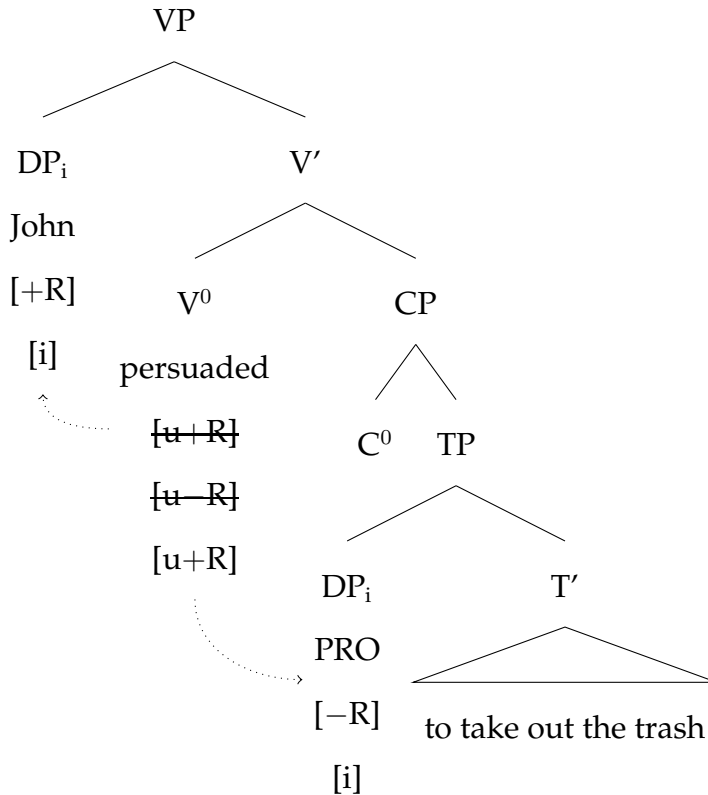
In essence, the control predicate Agrees with PRO, the controller and the argument which is not controlling PRO. In a sentence such as *John persuaded Mary PRO to be happy*, the control predicate *persuade* Agrees with *John*, *Mary* and PRO. However, it only cares about the relation $\{\text{RESP}\} \subseteq \{\emptyset\}$. Given that *John* bears the relation A to the situation and not RESP, it is effectively ignored. With this information, I posit the following control calculus for cases involving object.

- (179)
- | | |
|----------|--|
| Index 1: | \emptyset_1 / θ |
| Index 2: | $\emptyset_2 / \text{RESP}$ |
| Index 3: | \emptyset_3 / A |
| Control: | $\{\text{RESP}\} \subseteq \{\theta\}$ |

The predicate checks off one of its unvalued features with PRO and then the other with the nearest DP object, purely due to syntactic locality; lexical semantics does not play a role here. The derivation is given in (180). First, the control predicate checks off its features with the nearest two DPs, PRO and *John*, keeping track of their indexes.²⁶

- (180) Mary persuaded John to take out the trash.

- (181)



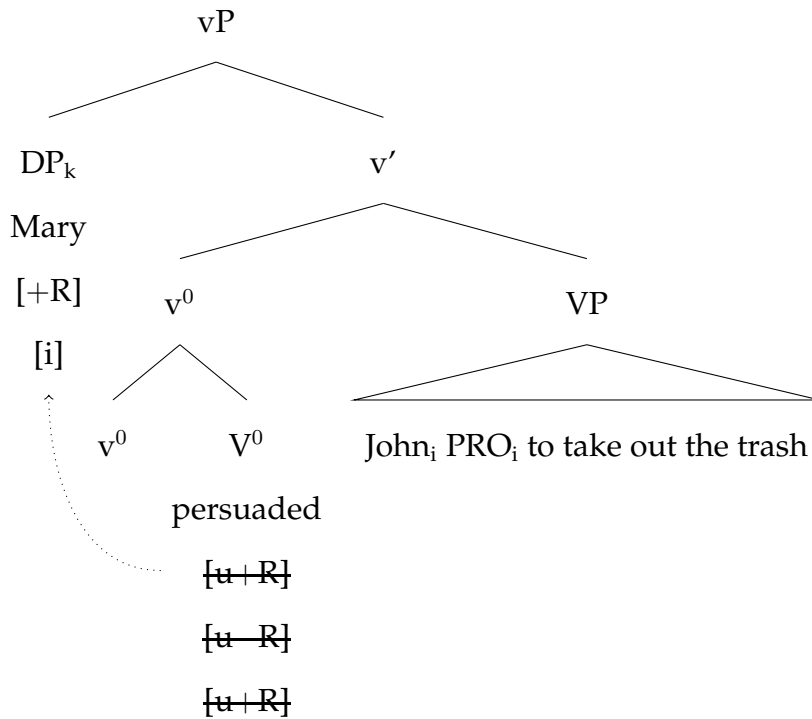
- | | |
|----------|-------------------------|
| Index 1: | i / θ |
| Index 2: | i / RESP |
| Index 3: | \emptyset_3 / A |
| Control: | $\{i\} \subseteq \{i\}$ |

Next, *Mary* Merges onto the tree after *persuade* Merges onto the v^0 head. The control

²⁶The astute reader will notice that *the trash* is also a DP that has a [+R] feature. Indeed, the control predicate could keep track of its feature, as it can Agree with it prior to *John* Merging onto the root of the tree, and this would be a flaw with the system. For this, I propose the *No Descending Condition* which I will elaborate further in Chapter 5.

predicate does Agree with it and keep track of its index, but this is extraneous since it is not relevant to the control relation. This is a necessary assumption to make as we will see in just the next section.

(182)



Index 1: i / θ

Index 2: $i / RESP$

Index 3: k / A

Control: $\{i\} \subseteq \{i\}$

4.3.2 Subject control across a DP

As it is for most approaches to control, subject control across a DP is the most difficult to derive; since control is derived by Agree, some form of the Minimal Link Condition or Relativized Minimality will necessitate that the predicate cannot just skip past the nearest DP. It has to Agree with it. However, this approach proposes that it has almost exactly the same derivation as for object control. The only difference between the two derivations is that the control calculus for subject control predicates has a different control requirement: the set containing the bearer of the relation A must be a subset of the set containing the index of PRO . In more mathematical terms, the relation to establish control in the case of *promise* is $\{A\} \subseteq \{\theta\}$ rather than $\{RESP\} \subseteq \{\theta\}$.

Why do verbs such as *promise* have a different control calculus? It is assumed that, following Culicover & Jackendoff (2001), the semantic role Source is what causes subject control in this predicate, and this is represented by my approach as having a different control calculus. A major consequence of this solution is that it rejects the autonomy of syntax as proposed by Chomsky (1957), which provides a basis for semantics rather than including it in the grammar. But control phenomena as seen in Chapter 2 show the need for a unified syntax and semantics approach to control, where both play a part in deriving sentences.

An assumption will need to be made to ensure that extraneous Agreement does not occur a second time with the same DP, as there are two [u+R] features. Both could be checked off before *promise* has the chance to Agree with the subject and get the second necessary index. In addition, one could argue that both features could be checked off by one Agree operation, as they are the same feature. To prevent this, we need a couple more rules.

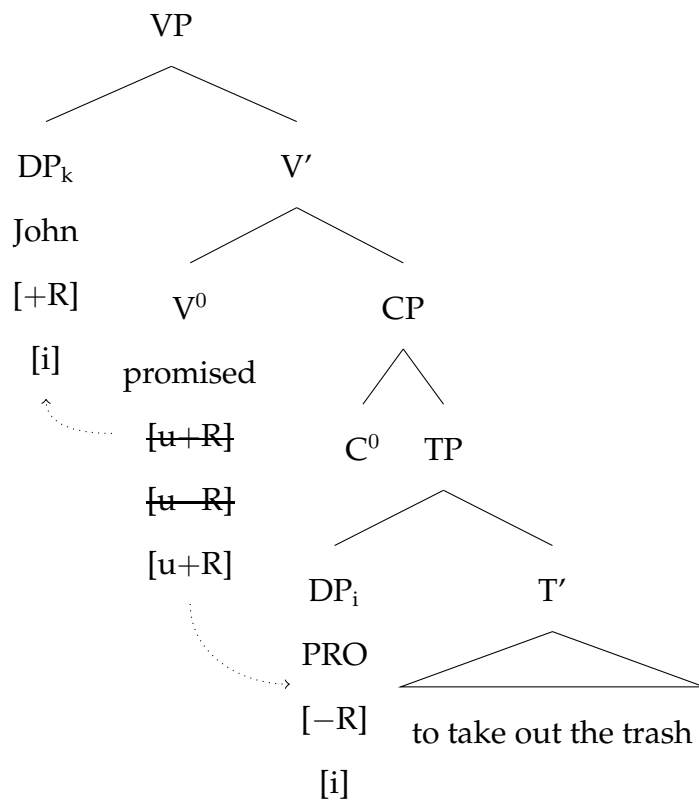
(183) Multiple Unvalued Feature Rule: For a syntactic object with two of the same kind of unvalued feature [uX], only one instantiation can be checked off per Agree operation.

(184) Multiple Agreement Rule: A syntactic object with unvalued feature [uX] cannot Probe for the same syntactic object with feature [X] more than once.

The example derivations are given below in (185)-(187). As in object control, the predicate keeps track of the index features of the DPs *John* and PRO. However, the control relation is not yet satisfied, given the different requirement.

(185) Mary promised John to take out the trash.

(186)

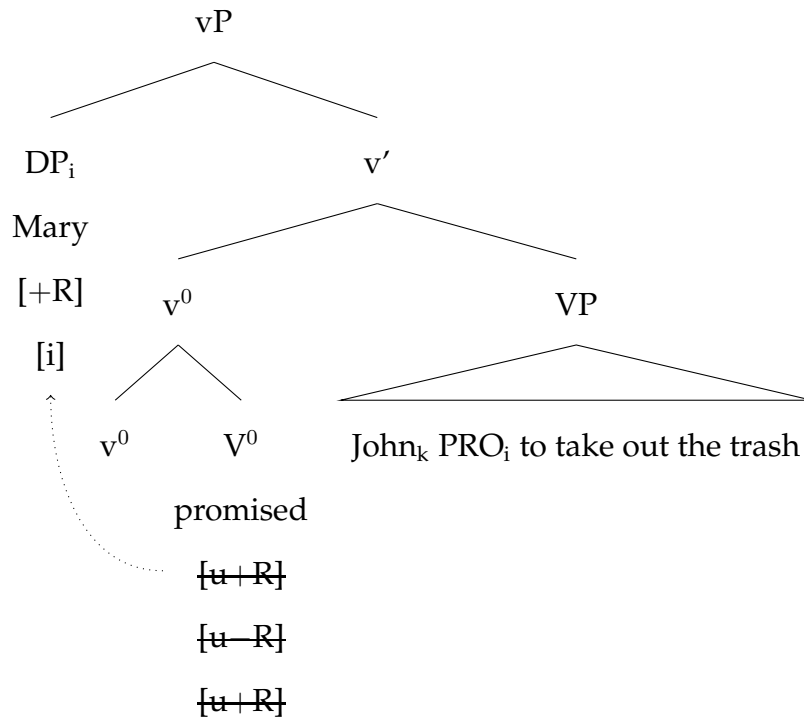
Index 1: i / \emptyset

Index 2: k / RESP

Index 3: \emptyset_3 / AControl: $\{\emptyset\} \subseteq \{i\}$

Once again, the control predicate keeps track of the index of its subject, *Mary* after it Merges onto the root of the tree. Given that it bears the relation A to the situation, at LF, the control relation is satisfied and the structure is deemed grammatical.

(187)



 Index 1: i / θ
Index 2: k / RESP Index 3: i / A

 Control: $\{i\} \subseteq \{i\}$

4.3.3 Control shift

Control shift is the phenomenon in which object control predicates can switch to subject control predicates and vice versa, if the infinitival clause is passivized.

(188) John_j persuaded Mary_m PRO_{j/*m} to be allowed to take out the trash.

(189) John_j promised Mary_m PRO_{m/*j} to be allowed to take out the trash.

The derivation that this thesis proposes for control shift is a more formal version of Farkas (1988)'s solution which argues for a markedness principle that selects for the relation A rather than RESP (this is inverted in the case of *promise*). The formalized markedness principle here involves predicates such as *persuade* taking on the control calculus of *promise*, while predicates such as *promise* take on the control calculus of *persuade*. In other words, control shift in sentences with *persuade* is very simply derived the same way as *promise* without shifting, and vice versa.

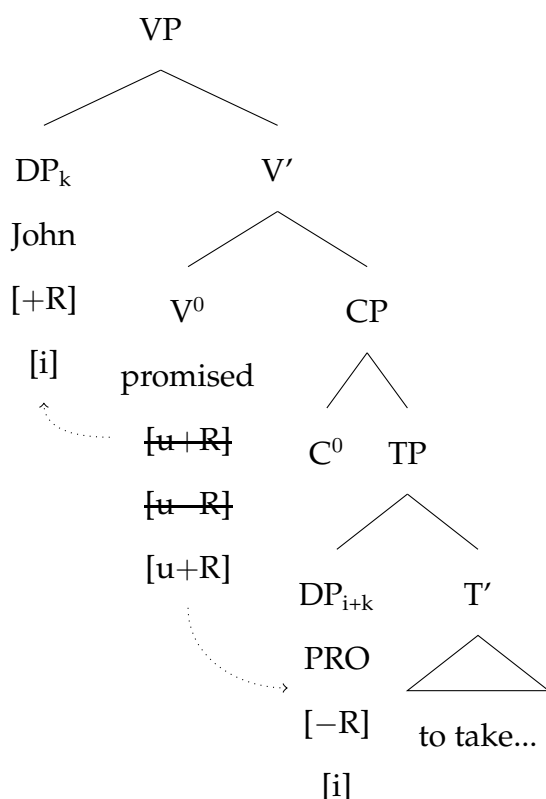
4.3.4 Split control

Landau (2013) notes that no approach to control has to date been able to account for split control. Thanks to the subset relation used to establish control, the approach proposed here does so straightforwardly.

Split control involves Agreement between two controllers of indexes x and y , and a controllee of index $x+y$, which includes both of the controllers and nothing else. The derivation for split control is almost identical to that of derivations with object control. The only difference is the different logical relation to satisfy control, $\{x\} \cup \{y\} \subseteq \{x+y\}$. The example derivation is in (190)-(192) below, with the same example sentence as in section 4.5, except with *together* added to force the split control reading of PRO.

(190) Mary promised John to take out the trash together.

(191)



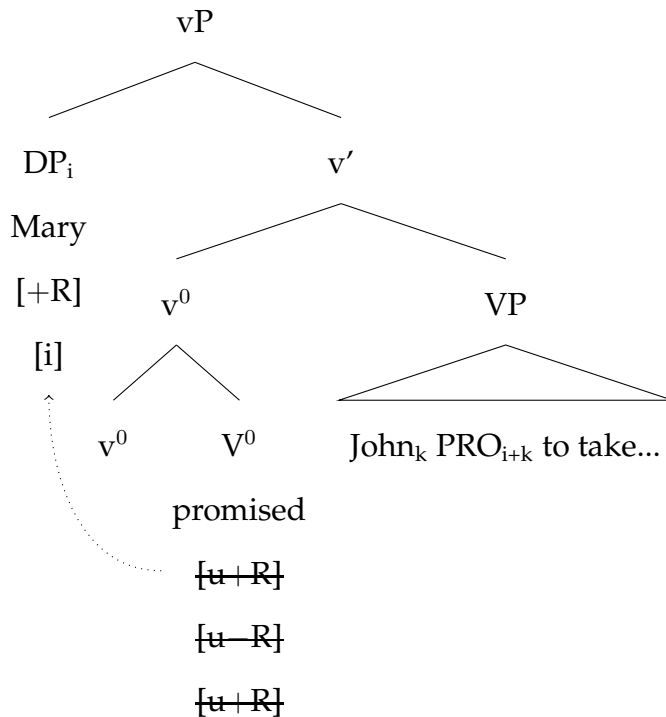
Index 1: i / θ

Index 2: k / RESP

Index 3: \emptyset_3 / A

Control: $\{i\} \cup \{\emptyset_3\} \subseteq \{i+k\}$

(192)



Index 1:	i / θ
Index 2:	k / RESP
Index 3:	i / A
Control:	$\{i\} \cup \{k\} \subseteq \{i+k\}$

It follows from the definitions of $\{i\}$, $\{k\}$ and $\{i+k\}$ that the control relation is satisfied.

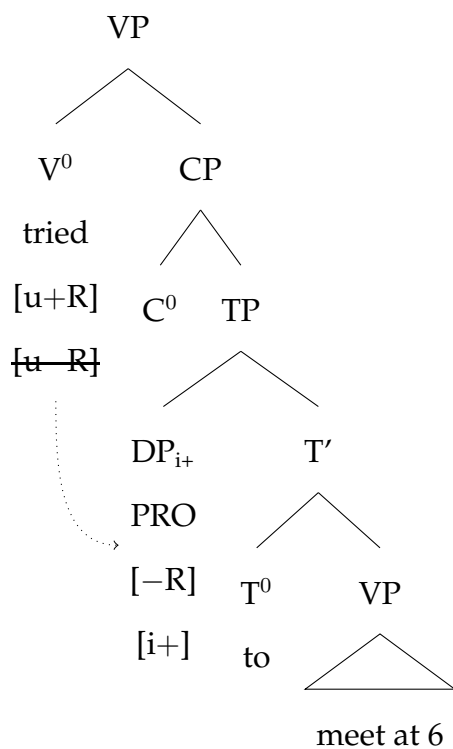
4.3.5 Partial control

To recap, partial control involves control when PRO has an index greater than but including i , the index of the controller, written as $i+$. As it was considered a problem at the time, Landau (1999)'s control as Agree approach was conceived of primarily to derive partial control.

Control in these predicates is derived in exactly the same way as in exhaustive control. As strict identity is not possible between an index i and $i+$, control is established with use of sets and the subset relation. The control predicate first Agrees with PRO, keeping track of the index $i+$.

(193) John tried to meet at 6.

(194)



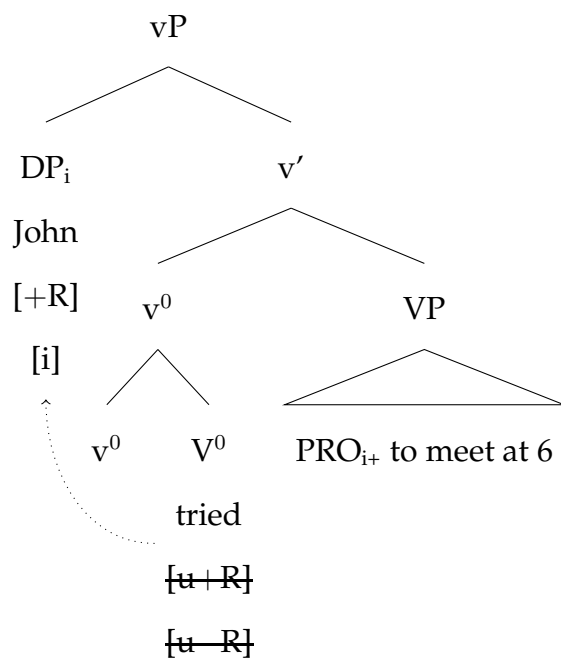
Index 1: i+

Index 2: ∅

Control: {i} ⊆ {i+}

A control relation is established when the control predicate Agrees with the subject, as {i} is a subset of {i+}, the derivation would be considered grammatical at LF.

(195)



Index 1: i+

Index 2: i

Control: ✓

This approach does not distinguish between deriving exhaustive and partial control in the narrow syntax. Landau notes that partial control predicates have semantic tense to distinguish them, and it would be nice to involve this feature in the derivation.

There are multiple ways to do this, but perhaps the simplest way is to assume that semantically tensed control predicates have the feature [+tense] while only PRO can possess the feature [u+tense]. This feature could be checked off as a reflex of Agree when the predicate Probes. This is similar to how *wh*-features are checked off in English.

4.3.6 Backward control

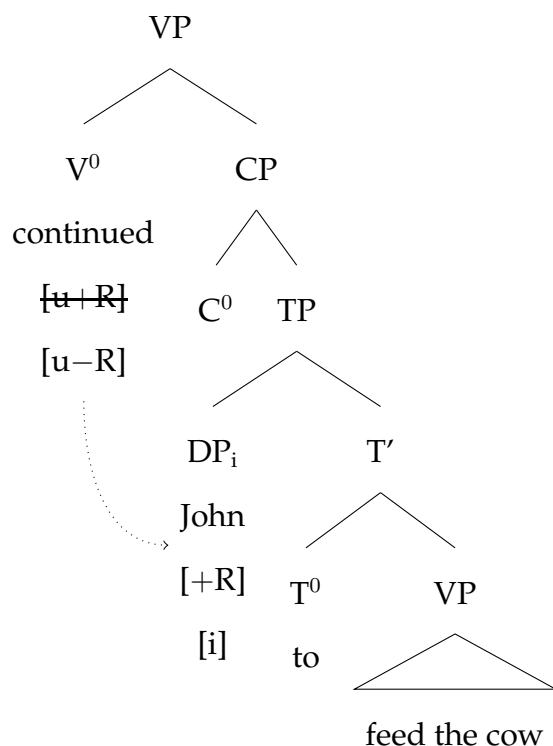
One of the main advantages of the view of control as Agree as given in this thesis is that it has a very straightforward way of accounting for backward control, a property that it shares with control as raising. It does not matter when the control predicate satisfies its unvalued features, as long as it checks them off. The control predicate first checks off [u+R] rather than [u−R], which is checked off second, and the derivation moves to LF.

In other words, the derivation of backward control is almost identical to that of obligatory control. For the sake of simplicity in this derivation²⁷, we will use the following sentence with backward control in Tsez translated into English. As noted, in Tsez, *continue* is a backward control predicate.

(196) PRO_i continued John_i to feed the cow.

²⁷I've used a control calculus with two empty slots rather than three, as would be the usual case for a predicate with a DP subject and an object, for the sake of simplicity as well.

(197)

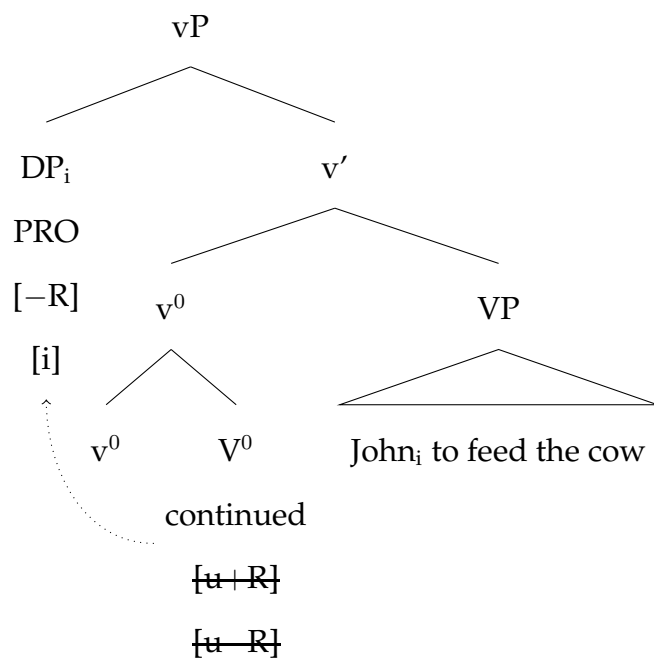


Index 1: i

Index 2: \emptyset Control: \emptyset

The control predicate first checks off its $[u+R]$ feature rather than $[u-R]$, simply because it is nearer. Only after PRO is Merged to Spec,vP is $[u-R]$ checked off.

(198)



Index 1: i

Index 2: i

Control: ✓

The reason why some languages do not allow backward control would simply be because they do not allow PRO in the subject position of a finite TP; alternatively, Principles B or C of binding theory may be at play in these languages. This would be the case in most languages, apart from languages such as Tsez.

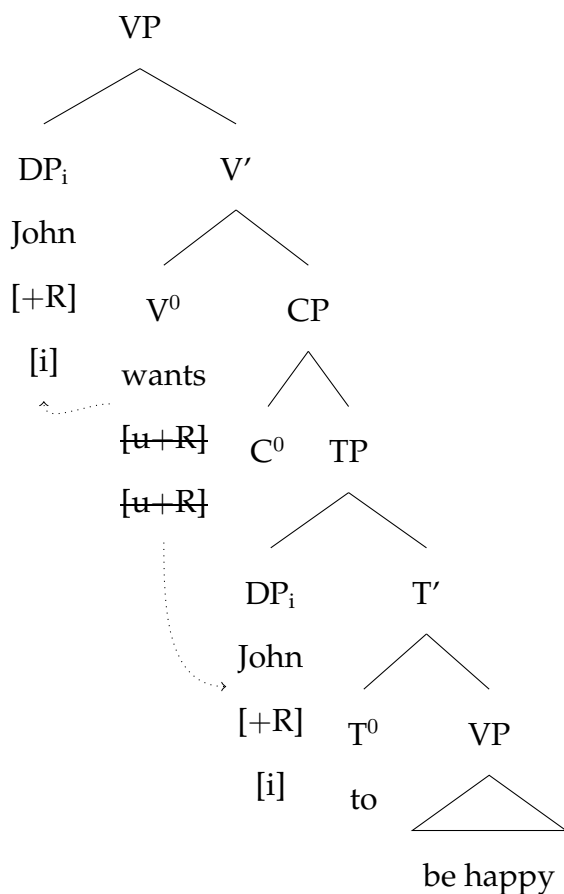
Although backward control is derived, there might be some difficulty in explaining why only certain predicates allow it; Polinsky & Potsdam (2002) notes that Tsez allows only a few aspectual verbs such as *began* and *continue* to have backward control. But one could assume that most verbs in Tsez do not allow a silent PRO in subject position, but there are a few that do. Perhaps certain classes of verbs have different phonological requirements for their subjects, unlike languages such as English. We should be able to see this show up for other silent subjects as well.

4.3.7 Copy control

Copy control is more difficult to derive than backward control, since copy control does not involve PRO, which has the syntactic feature $[-R]$, and control predicates have the unvalued syntactic feature $[u-R]$. This means that Agreement is unable to take place.

One can assume that control predicates in languages which allow copy control have another $[+R]$ feature rather than a $[u-R]$ feature for Agreement to take place, allowing for the grammar to establish the control relation between the two copies.

(199)



Index 1: i

Index 2: i

Control: ✓

Such languages may have two different varieties for each control predicate, one with two [u+R] features when copy control is intended, and one with one [u+R] and one [u−R] feature, as is the usual case in control. Copy control would not be allowed for languages in which the second variety of control predicate is not present.

4.4 Concluding Remarks

This chapter introduced the reader to a theory of control which, with some assumptions and theoretical tools, is capable of deriving many control phenomena. But it does so by giving importance to lexical semantics in deriving control in the narrow syntax, which can be both a boon and a bane; while it is able to account for the elusive case of *promise*, it contradicts Chomsky (1957)'s intuitions about the independent role of syntax in making structures for semantics to fill: syntax and semantics work together to derive control in *promise*.

Chapter 5 goes on to discuss the many theoretical implications of these assumptions and I attempt to derive the most problematic structures for this approach, which are finite and adjunct control; these structures necessitate Agreement inside islands.

5 Theoretical Consequences

5.1 Chapter Overview

This chapter goes over the theoretical consequences and problems that arise from this approach to control theory. Section 5.2 discusses some of the immediate theoretical predictions of this approach. Section 5.3 discusses Chomsky's classic conundrum of whether semantics plays a part in deriving grammatical sentences, and gives evidence from subject control and *tough*-predicates to argue that lexical semantics does contribute to grammaticality. Section 5.4 derives NOC facts, and accounts for individual variations in grammaticality for control sentences. Section 5.5 goes over the greatest problem for this approach: control inside finite clauses and adjuncts. Section 5.6 concludes.

5.2 Predictions: Split-Partial Control and No Descending Condition

The subset relation is used to derive partial and split control: my approach assumes that the set containing the index of the controller is a subset of the set containing the index of a partial control PRO, and that the union of the sets of the two sets containing the indexes of the controllers is the subset of the set containing the index of split control PRO. As Kenji Oda (p.c.) has pointed out to me, one might assume the existence of a set such as $\{(x+y)+\}$, which contains the index of PRO. It does seem to be a case that, even in English, we can have PRO with indexes such as this.

In other words, it is theoretically possible, given the loose definition I have given for $\{x+\}$, that $\{x+y\}$ is a subset of $\{(x+y)+\}$. Call this *split-partial control*. This is a prediction of my approach, and therefore, it would be a strength if we found sentences with this in English. And it seems that we do. Notice that *promise* is a desiderative, as Landau (2013) argues, and this class of predicates have semantic tense, meaning that partial control is possible with the split control predicate *promise*. The sentence in (5.2) seems to be grammatical.

(200) John_i promised Mary_k PRO_{i+k+} to meet the group at 6.

Another theoretically plausible consequence is that $\{x+y\}$ is a subset of $\{x+\}$. This also seems to be predicted. With the correct context given for the example above, it is possible to imagine a context in which the object of the verb is not a part of the referent of PRO at all.

(201) John_i promised Mary_k PRO_{i+} to meet the group at 6.

Therefore, this thesis predicts the existence of two phenomena that have yet to be documented in the literature. One might also posit the existence of partial-split control, which would be defined as $\{(x+)+y\}$ rather than $\{(x+y)+\}$. However, given the definitions that I have given in Chapter 4, the two sets are identical and therefore not separate phenomena.

Another theoretical prediction of this approach is that, once a syntactic object Probes for the nearest Goal, it cannot Probe lower in the tree than that Goal. Notice that the converse would lead to contradictory derivations in my approach. Take the sentence *John promised Mary to take out the trash*. *The trash* is a DP as well, with a [+R] feature, the control predicate could potentially Agree with this right after Agreeing with PRO, given that it is technically the nearest syntactic object with a [+R] feature prior to Mary merging as the object. This would lead to an ungrammatical derivation and an unintended result. I propose the following condition which likely does not have any negative consequences, given the local nature of syntactic derivations. I assume that the benefits of this approach to control outweigh the need for a more parsimonious theory of syntax.

(202) *No Descending Condition*: After Agreement between a Probe A and a Goal B, Probe A cannot Probe for a syntactic object c-commanded by Goal B.

Although *the trash* has a desired feature for the control predicate to check, this condition will block Agreement between the predicate and *the trash*, given that PRO c-commands *the trash*, deriving the intended result.

5.3 Is Syntax Independent from Semantics?

The previous chapter introduced the reader to a theory of control that advocated a role for lexical semantics in the derivation of a sentence in the narrow syntax. This has been a point of great controversy since Chomsky (1957), who was the first to argue that syntax is completely independent from semantics. A famous example is given in (203), a meaningless sentence that is nonetheless grammatical:

(203) Colorless green ideas sleep furiously.

For Chomsky, such examples show that syntax is independent from semantics, as it provides structures for which words are then lexically inserted into. The burden of proof, as Chomsky puts it, is on the linguist who believes that they have been able to develop a notion of grammaticality in terms of semantics.

While many linguists have noted the importance of lexical semantics in syntactic phenomena, this thesis attempts to provide more evidence for the existence of a syntax-semantics interface from the viewpoint of control theory. Starting with subject control, what seems to be the difference between (204)-(205) is Culicover & Jackendoff (2001)'s observation that the contrast between these two sentences from their paper is purely semantic:

(204) John's promise/vow/offer/guarantee/obligation/pledge/oath/commitment to Susan to take care of himself/*herself

(205) John's order/instructions/reminder/encouragement/invitation to Susan to take care of *himself/herself

Culicover & Jackendoff (2001) argue that there is no syntactic difference whatsoever between (204)-(205). In the first sentence, we have subject control, while in the second sentence we have object control, despite only differing in the choice of nominals.

Attempts to come up with a syntactic difference would be *ad hoc* as the sentences are so similar. One way of doing so might be to take for granted that the θ -Criterion

exists and is driven by features as in Hornstein (1999), and an approach similar to proposed in this thesis in that control is made when the predicate Agrees with PRO and its controller. Rather than having [u+R] and [u−R] features drive Probing, one could use θ -features to drive Agree with some assumptions. This approach could assume that *promise* attempts to Agree with a DP that has an Agent θ -role while other predicates Agree with the nearest Theme θ -role-bearing DP. This approach, however, is very complicated and assumes the existence of the *ad hoc* syntactic θ -Criterion.

A much simpler solution would be to assume that the nouns in (204) bear the thematic role Source, the giver of the promise, which for whatever reason, forces subject control. The nouns in (205) do not possess Source.

The approach proposed in this thesis formalizes this, giving a role for lexical semantics in the narrow syntax. As seen in the previous chapter, each control predicate is paired with a control calculus, that keeps track of the index of the controller and the controllee with the operation Agree.

Each control calculi may have two or three slots for indexes. In the case of subject control, one slot in the calculus has the requirement that it can only be satisfied by the index of a DP that is the Source of the promise: in Farkas's terms, the one that bears relation A to the embedded infinitival. Further, the control predicate may only Agree with each DP once. The nearest DP in the case of subject control is Probed extraneously, after which it Agrees with the subject. This guarantees subject control.

Further, the semantic easiness scale may also provide more evidence in favor of this interaction. In particular, *tough*-adjectives on the easiness scale and those which are not can influence whether control is obligatory or non-obligatory. Consider Brody (1993)'s contrast between (206) and (207).

(206) *PRO to teach them_i math is easy for the children_i.

(207) PRO to teach them_i math is useful for the children_i

Similar to Culicover & Jackendoff's examples, these sentences involve structures which

are syntactically seemingly identical yet differ only in the choice of the control predicate. Brody does not explore the consequences of this contrast, but one can find more evidence for the importance of lexical semantics in syntax with further digging.

First, Kawasaki (1993)'s example of genuinely unrestricted PRO_{arb} with *dangerous* in (208) can be extended to include other *tough*-predicates not on the easiness scale; that is, it is possible to imagine a context where (209) and (210) are grammatical.

(208) It is dangerous/harmful/uncomfortable for babies [PRO_{arb} to smoke around them].

(209) It is fun/exciting/enjoyable for babies [PRO_{arb} to blow bubbles around them].

(210) It is boring/unexciting/a pain for children [PRO_{arb} to help them learn math].

However, this is not possible when we consider *tough*-predicates that are not on the easiness scale; it is difficult to imagine a context in which similar NOC sentences can be grammatical. Often, such sentences seem meaningless. This is easily fixed by making the sentence have OC in (212).

(211) *It is hard/impossible/difficult for children [PRO_{arb} to help them learn math].

(212) It is hard for children_i [PRO_i to learn math].

To recap, NOC with *tough*-predicates is only possible when the predicate is not on the easiness scale; only OC is allowed when the predicate is on the easiness scale. What all of these examples show is the need to involve lexical semantics in the derivation of sentences. Contra Chomsky (1957), it would be difficult to imagine creating a system of grammar that could derive the contrasts seen in this section without giving some reference to the lexical semantics of control predicates.

5.4 Non-Obligatory Control and Perceptual Factors

Although the previous chapter of this thesis derived OC, it did not comment on what kind of a phenomenon NOC is, which, as Hornstein (1999)'s examples note in (213)-

(216), seems to be at odds with the syntactic operations Move and Agree, both of which use the notion of c-command, which this thesis relies on to derive OC.

(213) It was believed that [PRO shaving was important]. *Classical NOC*

(214) John_i thinks that it is believed that [PRO_i shaving himself is important]. *Non-local antecedent*

(215) Clinton's_i campaign believes that [PRO_i keeping his sex life under control] is necessary for electoral success. *Non-c-commanding*

(216) John_i told Mary_j [that [[PRO_{i+j} washing themselves/each other] would be fun]]. *Split NOC*

Hornstein (1999) is wrong to think that any of these are cases of arbitrary control. All of these sentences can be rephrased to make the implicit controller visible: *It was/is believed by people* and the last sentence can be rephrased as *is necessary to Clinton for electoral success*. If Bhatt & Izvorski (1998) and others are correct in arguing that these examples do not constitute NOC control, then OC control inside embedded finite clauses exists in English. It is particularly troubling for this approach as it would involve Agreement with PRO which is inaccessible to syntactic operations inside Chomsky (2001)'s conception of a strong phase.

What we need is a genuine case of arbitrary control, where there cannot be an implicit experiencer to control PRO. We saw this in examples (208)-(210). How do we derive these sentences? My answer to this is to say that the control calculus simply does not play a role in these derivations, nor are these unvalued features present on the control predicate in cases of NOC.

Obligatory control predicates such as *promise*, *persuade* and *managed* necessarily involve the presence of the unvalued features on the predicate. The few genuine NOC predicates that we've discussed are all *tough*-predicates that are not on the easiness scale, such as *dangerous*, *embarrassing*, *fun*. Perhaps these are the only NOC predicates

that exist. For some reason, these predicates do not have the features [u+R] and [u−R]; alternatively they may still be around, but Agree is extraneous given the lack of the control calculus. But this gets us arbitrary control.

Another mechanism that is needed is some way to derive Chomsky (1981)'s observation that NOC PRO is necessarily [+human], as previously noted in Chapter 2. (218) is awkward because it sounds like a person would be snowing, something that is impossible.

(217) For it to snow all day would prevent me from going to school.

(218) *To snow all day would prevent me from going to school.

A simple way of deriving this distinction is to give these *tough*-predicates a [u+human] feature to ensure that these derivations give us NOC sentences with [+human] PRO. Why is it that *tough*-predicates require NOC PRO to be [+human]? This is a question that has to be answered by semanticists, and I leave it open for future research. However, one must note that the necessary presence of [+human] on PRO somehow precludes the presence of the control calculus.

A final point of observation to make regarding these unvalued features is that their placement seems to be subject to personal attitudes and perceptual factors. While the majority of the native English speakers I talked to found (211) ungrammatical, a sizable portion thought that it was completely fine. Some went so far as to say that (208)-(210) were all ungrammatical, even though a majority did accept them.

The influence of personal attitudes in control has been noted often in the literature. Another example is long distance control, as seen in (219) is noted by Chierchia & Jacobson (1986) to have unclear intuitions. Long distance control is similar to subject control in that the controller of PRO is not the most local DP. Some speakers cannot get it at all, whereas most find it merely disfavorable but not ungrammatical.

(219) Mary_i thought that John_i said that [PRO shaving herself] would bother Sue.

So it is important for a theory of control to be able to account for why certain people differ in what they find grammatical. The approach advocated by this thesis is flexible, in that each person may possess different features for control predicates. This can lead to alternate derivations for each individual.

Although most native English speakers get NOC with *tough*-predicates not on the easiness scale and OC with those on it, some speakers who do not fit this pattern exist. Consider the person who finds arbitrary control ungrammatical in all *tough*-predicates. *Tough*-predicates, for this person, would always possess the control calculus, regardless of whether or not these predicates are on the easiness scale. Consider the admittedly rare person that finds arbitrary control grammatical only with *tough*-predicates that are on the easiness scale, and not grammatical with other predicates. This person would have the opposite placement of [u+R] and [u−R] on the predicates that we discussed. In this way, individual variation of grammaticality can be accounted with this approach.

5.5 Islands

The final consequence of this approach that will be considered in this thesis is an important one. Examples (213)-(216) and (219), are cases in which a controller outside of the embedded clause controls PRO inside the embedded clause, which is finite.

Another kind of obligatory control is finite control, which is attested in some languages: PRO is actually the subject of a finite embedded clause, and the embedded verb has tense and agreement inflection. Landau (2013)'s example is reproduced below in (220), and he shows that it is a case of OC.

- (220) Rina bikša me-Gil_i [še-PRO_i yivdok šuv et ha-toca'ot].
 Rina asked from-Gil that would.check.3SG again ACC the-results
 'Rina asked Gil to double-check the results.'

The problem here is that, according to Chomsky (2001)'s conception of a phase, the embedded finite clauses are not accessible for syntactic operations from outside the phase.

In all of these examples, the controller is in the matrix clause. Discussing the nature of phases will help guide us towards a solution.

Chomsky's *Phase Impenetrability Condition* (PIC) was created in order to reduce the computational burden that would be great in long sentences, while also getting us cyclicity and capturing island phenomena. It is essentially the idea that derivations proceed in chunks, and movement out of a phase is not allowed: after it is completed, the complement of the phase X^0 is transferred to PF and LF for semantic and phonological computation, inaccessible to further syntactic operations.

For Chomsky, strong phases are θ -complete vPs and CPs. Defective CPs are weak phases, and an example of this would be control infinitives, because they are nonfinite, along with passive vPs. Weak phases are not transferred to PF and LF, and they are open to syntactic operations.²⁸ A phase is complete when an entire phase is taken as a complement of a head. Only the phase edge (the head and specifier of the phase, so C^0 and Spec,CP) is open to syntactic operations. The *edge-feature* on a head allows syntactic objects with unvalued features to move to the edge of the phase, and thereby move out.

Control infinitives are usually non-finite, so the phases are weak: they allow Agreement inside them. However, (213)-(216) and (219) involve Agreement inside a strong phase, the contents of which have already been transferred to PF and LF. They are not open for any kind of syntactic operations from outside of the phase anymore. This seems like a powerful counterargument to the idea that the control predicate Agrees with PRO at all.

However, there is reason to think that we do get long-distance agreement inside finite clauses. Bošković (2007) argues that the operation Agree is not subject to the PIC. He notes that multiple languages allow agreement with an object inside a finite CP, such as Chukchee in (221). The matrix v agrees with the object of the embedded clause, flaunt-

²⁸Richards (2011) argues that weak phases restrict Movement but not Agreement, by allowing transfer to PF to take place, but not transfer to LF.

ing the PIC.²⁹

- (221) ənan qelyilu-lənərkə-nin-et [inɣun Ø-rətəmnəv-nen-at qora-t].
 he regrets-3-PL that 3SG-lost-3-PL reindeer-PL
 'He regrets that he lost the reindeers.'

This gives us reason to think that the syntactic operation Agree can penetrate both strong and weak phases, and it is therefore possible to derive OC in finite clauses.

The final counterexample to consider is adjunct control, in which we have OC inside adjuncts: examples are given in (222)-(224) below. Such examples are particularly troubling as they also involve Agree inside environments which are impenetrable to syntactic operations.

- (222) He called us before looking around. *Temporal clause*
 (223) He ate at Chipotle to fill his stomach. *Goal clause*
 (224) He stopped to think what a fool he had been. *Stimulus clause*

However, Chomsky (2001)'s PIC was also created to account for the existence of islands, among other things. It would be *ad hoc* to assume that there are syntactically impenetrable environments other than phases, and we should try to unify these approaches: Adger (2003) derives island phenomena by assuming the PIC and blocking the movement of syntactic objects from classical islands, even though phases do allow Movement in some circumstances. My solution is to propose that even islands are open to Agree, but not Move.

This may be difficult for the syntactician to accept. However, it is worth noting that all of the original evidence from Ross (1967) in favor of the existence of islands is that it blocks Movement, but there is no evidence that the operation Agree is blocked. Sentences (225)-(233) show five island constraints from Ross (1967), but these are just examples to illustrate that Ross's evidence is that Movement is blocked, and there is no reason to think that Agreement is blocked too.

²⁹Frantz (1973) provides more evidence of Agreement into finite clauses in Blackfoot.

- (225) Which game did John say Bill played?
- (226) *Which game did John wonder whether Bill played? *Wh-island Constraint*
- (227) *Which game did John eat a sandwich before Bill played? *Adjunct Constraint*
- (228) Who did John believe that Bill beat?
- (229) *Who did John believe the claim that Bill beat? *Complex Noun Phrase Constraint*
- (230) John bought a game and an apple.
- (231) *What did John buy and an apple? *Coordinate Structure Constraint*
- (232) That John played a game is true.
- (233) Who is that played a game is true? *Subject Constraint*

Though there does not seem to be any evidence blocking Agree inside syntactic islands, many, such as Boeckx & Grohmann (2007), want to think of islands as something different from phases, due to the possibility of extraction from phases by Movement to the edge via the edge-feature. If phases allow Movement out of them, then why should anything be an island at all? But the problem with thinking islands as different from phases is that it is *ad hoc*, and it is possible to derive the existence of islands by assuming further constraints on Movement, as Adger (2003) does.

If one does not wish to accept the conclusion that all phases and islands are penetrable by Agree but not Move, then this does not mean that we have to give up the approach proposed by this thesis. As we have briefly discussed, phases do allow the opportunity for cyclic Movement.

One could assume the existence of some unvalued feature on PRO, which is not checked off until it Agrees with the control predicate as a reflex of the usual Agreement proposed in Chapter 4 between the predicate and PRO. With Chomsky's edge-feature, PRO can move up to the edge of the phase, which is accessible to syntactic operations under any account of phases, and Agree with the control predicate. This would derive all of the control phenomena that we have seen in this thesis. Notice that, as PRO is

phonologically silent, this does not have any effect on the surface structure of control sentences. PRO would only be getting to the edge of the island, rather than escaping it.

A problem for this solution would be that it is *ad hoc*, and we shouldn't assume the existence of more unvalued features unless necessary. Furthermore, if islands are not phases after all because they are too lax with movement and no syntactic operations can occur inside an island whether or not an object is at the edge, then this approach can never hope to account for adjunct control.

5.6 Concluding Remarks

In this section, I've given multiple reasons to think that Chomsky (1957)'s notion of a syntax completely independent from semantics is not tenable in its strict sense, based on evidence from subject control, and *tough*-predicates, when the presence of the semantic easiness scale causes a predicate to have obligatory control. I've attempted to account for the existence of non-obligatory control and introduced a mechanism for individual variations in grammar.

Finally, I've tried to come up with a solution for control inside finite clauses and islands, troubling for an account which relies on Agreement with PRO itself. I've concluded that both weak and strong phases may block Movement but not Agreement.

6 Conclusion

I've presented multiple facts in control phenomena that are difficult for any approach to account for. First, PRO genuinely exists and it cannot be reduced to Movement. Second, control is not a strict identity relation, as partial and split control exist; in fact, even cases of split-partial control, where these two occur at the same time, exist. Finally, lexical semantics plays an essential part in deriving control phenomena such as subject control across a DP and OC in *tough*-predicates on the easiness scale.

After presenting contemporary approaches on control, I concluded that none of them come very close to accounting for the multifarious phenomena seen in control structures across languages. The approach proposed in this thesis is able to derive the control phenomena seen in Chapter 2 by assuming the existence of a control calculus, paired alongside each control predicate. The control calculus has empty slots that is filled by Agree, with the index of the DPs that the control predicate Probes for. When these slots are filled, if the subset relation is satisfied rather than strict identity, this accounts for partial and split control.

Some assumptions on the nature of phases and islands must be made for this approach to work, given the existence of control in island structures. It is up to syntacticians to decide whether the approach proposed in this paper solves enough problems to be worth the consequences that it brings along with it.

Before concluding the thesis, I would like to open up potential topics for future research. This thesis remained ambiguous on the true nature of PRO, and it is indeed possible for this theory of control to not make any specific reference to PRO at all, merely arguing that there is some kind of a subject that exists in the infinitival clauses of control structures that has a [u-R] feature, as we saw in Chapter 1. In addition, this thesis has so far remained ambiguous as to whether control theory can be reduced to binding theory, which was a source of controversy in the 1980s and 90s. However, the theory proposed in this thesis may be able to shed light on both of these fundamental issues.

It is a contradiction for PRO to be both anaphoric and pronomial at the same time, given the unavoidable existence of PRO_{arb}. One way around this might be to claim that PRO is simply not anaphoric, and it is a pronoun just like *he*, *she*, and so on. In fact, it is very similar to little *pro*. The reason it seems like an anaphor is due to the control calculus and the Agreement features that force the indexes to be the same, but I assume that this process differs from the one that makes true anaphors such as *himself*.

In that case, the fundamental difference between PRO and *pro* would be that PRO simply cannot receive Case, so it is allowed only in Caseless embedded infinitival positions. The obvious problem with this is PRO seemingly getting accusative Case in Icelandic; one way around this might be to posit that little *pro* is present in control structures in Icelandic rather than PRO, for whatever reason. This idea predicts that little *pro* should be independently present in Icelandic, which it did seem to be at least one point in the past: Holmberg (2005) argues that early Icelandic is a language with little *pro* and modern Icelandic is a partial null subject language.

Finally, this approach may predict a combined theory of control and binding. Many of the tools used in this thesis, such as [R] features and index features, seem to be very suitable for such a task. While I will not comment on the details of such a binding theory here, it is theoretically fortuitous to assume the existence of a unified theory. At the very least, a true anaphor such as *himself* would differ from a pseudoanaphor such as PRO in that the former has a different process by which it is bound by a DP but the latter indirectly ends up sharing its index with its controller(s) due to the control calculus. Assuming a distinction between genuine anaphors, and pseudoanaphors such as PRO which are actually pronomial would solve the unsolved problem of the nature of the existence of PRO.

Regardless of whether or not one agrees with the approach proposed by this thesis, the important role of lexical semantics in the syntax in deriving these sentences is less controversial. The existence of *promise* and differences in obligatoriness in control with

tough-predicates is strong evidence for a view of control in which syntax and semantics are tightly intertwined. We cannot have a view which completely ignores one side for the sake of the other, as most approaches do today. Syntax, as well as semantics, play important roles and collaborate with each other in an adequate account of control. This thesis has made specific and explicit proposals as to how such collaborations between these two components of grammar can proceed to cover all instances of control.

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